



## **Cisco UCS C420 Server Installation and Service Guide**

Covers Server Generation M3

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## Preface

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This preface describes the audience, organization, and conventions of the *Cisco UCS C420 Server Installation and Service Guide*. It also provides information about how to obtain related documentation.

## Audience

This guide is for experienced network administrators who configure and maintain Cisco servers.

## Organization

This guide is organized as follows:

Chapter	Title	Description
Chapter 1	<a href="#">Overview of the Cisco UCS C420 Server</a>	Provides an overview of the Cisco UCS (Unified Computing System) C420 server.
Chapter 2	<a href="#">Installing the Server</a>	Describes how to install the server in a rack, how to cable and power on the server, and how to initially set up the server in standalone mode.
Chapter 3	<a href="#">Maintaining the Server</a>	Describes the server LEDs and buttons, identifies the replaceable components of the server, and describes how to replace them.
Appendix A	<a href="#">Server Specifications</a>	Lists physical, environmental, and power specifications for the server.
Appendix B	<a href="#">Power Cord Specifications</a>	Lists specifications for the supported international power cords.
Appendix C	<a href="#">RAID Controller Considerations</a>	Provides server RAID controller information.
Appendix D	<a href="#">Installation for Cisco UCS Integration</a>	This appendix has been replaced with a link to new UCS Integration Guides.

# Conventions

This document uses the following conventions for notes, cautions, and safety warnings. Notes and cautions contain important information that you should know.



## Note

Means *reader take note*. Notes contain helpful suggestions or references to material that are not covered in the publication.



## Caution

Means *reader be careful*. Cautions contain information about something you might do that could result in equipment damage or loss of data.

Safety warnings appear throughout this guide in procedures that, if performed incorrectly, can cause physical injuries. A warning symbol precedes each warning statement.



## Warning

### IMPORTANT SAFETY INSTRUCTIONS

**This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.** Statement 1071

### SAVE THESE INSTRUCTIONS

## Waarschuwing

### BELANGRIJKE VEILIGHEIDSINSTRUCTIES

**Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.**

### BEWAAR DEZE INSTRUCTIES

## Varoitus

### TÄRKEITÄ TURVALLISUUSOHJEITA

**Tämä varoitusmerkki merkitsee vaaraa. Tilanne voi aiheuttaa ruumiillisia vammoja. Ennen kuin käsittelet laitteistoa, huomioi sähköpiirien käsittelemiseen liittyvät riskit ja tutustu onnettomuuksien yleisiin ehkäisytapoihin. Turvallisuusvaroitusten käännökset löytyvät laitteen mukana toimitettujen käännettyjen turvallisuusvaroitusten joukosta varoitusten lopussa näkyvien lausuntonumeroiden avulla.**

### SÄILYTÄ NÄMÄ OHJEET



**Attention    IMPORTANTES INFORMATIONS DE SÉCURITÉ**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

**CONSERVEZ CES INFORMATIONS****Warnung    WICHTIGE SICHERHEITSHINWEISE**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

**BEWAHREN SIE DIESE HINWEISE GUT AUF.****Avvertenza    IMPORTANTI ISTRUZIONI SULLA SICUREZZA**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

**CONSERVARE QUESTE ISTRUZIONI****Advarsel    VIKTIGE SIKKERHETSINSTRUKSJONER**

Dette advarselssymbolet betyr fare. Du er i en situasjon som kan føre til skade på person. Før du begynner å arbeide med noe av utstyret, må du være oppmerksom på farene forbundet med elektriske kretser, og kjenne til standardprosedyrer for å forhindre ulykker. Bruk nummeret i slutten av hver advarsel for å finne oversettelsen i de oversatte sikkerhetsadvarslene som fulgte med denne enheten.

**TA VARE PÅ DISSE INSTRUKSJONENE****Aviso    INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você está em uma situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha conhecimento dos perigos envolvidos no manuseio de circuitos elétricos e familiarize-se com as práticas habituais de prevenção de acidentes. Utilize o número da instrução fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham este dispositivo.

**GUARDE ESTAS INSTRUÇÕES**

**¡Advertencia! INSTRUCCIONES IMPORTANTES DE SEGURIDAD**

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

**GUARDE ESTAS INSTRUCCIONES****Varning! VIKTIGA SÄKERHETSANVISNINGAR**

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

**SPARA DESSA ANVISNINGAR****Opozorilo FONTOS BIZTONSÁGI ELOÍRÁSOK**

Ez a figyelmeztető jel veszélyre utal. Sérülésveszélyt rejtő helyzetben van. Mielőtt bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplő figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján kereshető meg.

**ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!****Предупреждение ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ**

Этот символ предупреждения обозначает опасность. То есть имеет место ситуация, в которой следует опасаться телесных повреждений. Перед эксплуатацией оборудования выясните, каким опасностям может подвергаться пользователь при использовании электрических цепей, и ознакомьтесь с правилами техники безопасности для предотвращения возможных несчастных случаев. Воспользуйтесь номером заявления, приведенным в конце каждого предупреждения, чтобы найти его переведенный вариант в переводе предупреждений по безопасности, прилагаемом к данному устройству.

**СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ****重要的安全性说明**

此警告符号代表危险。您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾提供的声明号码来找到此设备的安全性警告说明的翻译文本。

请保存这些安全性说明

的标准工作程序。 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止策に留意してください。警告の各国語版は、各注意事項の番号を基に、装置に付属の「Translated Safety Warnings」を参照してください。

これらの注意事項を保管しておいてください。

주의 중요 안전 지침

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이 지시 사항을 보관하십시오.

**Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

**Este símbolo de aviso significa perigo. Você se encontra em uma situação em que há risco de lesões corporais. Antes de trabalhar com qualquer equipamento, esteja ciente dos riscos que envolvem os circuitos elétricos e familiarize-se com as práticas padrão de prevenção de acidentes. Use o número da declaração fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham o dispositivo.**

**GUARDE ESTAS INSTRUÇÕES**

**Advarsel VIGTIGE SIKKERHEDSANVISNINGER**

**Dette advarselssymbol betyder fare. Du befinder dig i en situation med risiko for legemeskade. Før du begynder arbejde på udstyr, skal du være opmærksom på de involverede risici, der er ved elektriske kredsløb, og du skal sætte dig ind i standardprocedurer til undgåelse af ulykker. Brug erklæringsnummeret efter hver advarsel for at finde oversættelsen i de oversatte advarsler, der fulgte med denne enhed.**

**GEM DISSE ANVISNINGER**

تحذير

إرشادات الأمان الهامة

يوضح رمز التحذير هذا وجود خطر. وهذا يعني أنك متواجد في مكان قد ينتج عنه التعرض لإصابات. قبل بدء العمل، احذر مخاطر التعرض للصدمات الكهربائية وكن على علم بالإجراءات القياسية للحيولة دون وقوع أي حوادث. استخدم رقم البيان الموجود في آخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز. قم بحفظ هذه الإرشادات

**Upozorenje VAŽNE SIGURNOSNE NAPOMENE**

Ovaj simbol upozorenja predstavlja opasnost. Nalazite se u situaciji koja može prouzročiti tjelesne ozljede. Prije rada s bilo kojim uređajem, morate razumjeti opasnosti vezane uz električne sklopove, te biti upoznati sa standardnim načinima izbjegavanja nesreća. U prevedenim sigurnosnim upozorenjima, priloženima uz uređaj, možete prema broju koji se nalazi uz pojedino upozorenje pronaći i njegov prijevod.

**SAČUVAJTE OVE UPUTE****Upozornění DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY**

Tento upozorňující symbol označuje nebezpečí. Jste v situaci, která by mohla způsobit nebezpečí úrazu. Před prací na jakémkoliv vybavení si uvědomte nebezpečí související s elektrickými obvody a seznamte se se standardními opatřeními pro předcházení úrazům. Podle čísla na konci každého upozornění vyhledejte jeho překlad v přeložených bezpečnostních upozorněních, která jsou přiložena k zařízení.

**USCHOVEJTE TYTO POKYNY****Προειδοποίηση ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ**

Αυτό το προειδοποιητικό σύμβολο σημαίνει κίνδυνο. Βρίσκεστε σε κατάσταση που μπορεί να προκαλέσει τραυματισμό. Πριν εργαστείτε σε οποιοδήποτε εξοπλισμό, να έχετε υπόψη σας τους κινδύνους που σχετίζονται με τα ηλεκτρικά κυκλώματα και να έχετε εξοικειωθεί με τις συνήθειες πρακτικές για την αποφυγή ατυχημάτων. Χρησιμοποιήστε τον αριθμό δήλωσης που παρέχεται στο τέλος κάθε προειδοποίησης, για να εντοπίσετε τη μετάφρασή της στις μεταφρασμένες προειδοποιήσεις ασφαλείας που συνοδεύουν τη συσκευή.

**ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ****אזהרה****הוראות בטיחות חשובות**

סימן אזהרה זה מסמל סכנה. אתה נמצא במצב העלול לגרום לפציעה. לפני שתעבוד עם ציוד כלשהו, עליך להיות מודע לסכנות הכרוכות במעגלים חשמליים ולהכיר את הנהלים המקובלים למניעת תאונות. השתמש במספר ההוראה המסופק בסופה של כל אזהרה כדי לאתר את התרגום באזהרות הבטיחות המתורגמות שמצורפות להתקן.

**שמור הוראות אלה****Opomena VAŽNI BEZBEDNOSNI NAPATSTVIJA**

Симболот за предупредување значи опасност. Се наоѓате во ситуација што може да предизвика телесни повреди. Пред да работите со опремата, бидете свесни за ризикот што постои кај електричните кола и треба да ги познавате стандардните постапки за спречување на несреќни случаи. Искористете го бројот на изјавата што се наоѓа на крајот на секое предупредување за да го најдете неговиот период во prevedените безбедносни предупредувања што се испорачани со уредот.

**ЧУВАЈТЕ ГИ ОБИЕ НАПАТСТВИЈА**

**Ostrzeżenie WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA**

Ten symbol ostrzeżenia oznacza niebezpieczeństwo. Zachodzi sytuacja, która może powodować obrażenia ciała. Przed przystąpieniem do prac przy urządzeniach należy zapoznać się z zagrożeniami związanymi z układami elektrycznymi oraz ze standardowymi środkami zapobiegania wypadkom. Na końcu każdego ostrzeżenia podano numer, na podstawie którego można odszukać tłumaczenie tego ostrzeżenia w dołączonym do urządzenia dokumencie z tłumaczeniami ostrzeżeń.

**NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ****Upozornenie DÔLEŽITÉ BEZPEČNOSTNÉ POKYNY**

Tento varovný symbol označuje nebezpečenstvo. Nachádzate sa v situácii s nebezpečenstvom úrazu. Pred prácou na akomkoľvek vybavení si uvedomte nebezpečenstvo súvisiace s elektrickými obvodmi a oboznámte sa so štandardnými opatreniami na predchádzanie úrazom. Podľa čísla na konci každého upozornenia vyhľadajte jeho preklad v preložených bezpečnostných upozorneniach, ktoré sú priložené k zariadeniu.

**USCHOVAJTE SI TENTO NÁVOD****Opozorilo POMEMBNI VARNOSTNI NAPOTKI**

Ta opozorilni simbol pomeni nevarnost. Nahajate se v situaciji, kjer lahko pride do telesnih poškodb. Preden pričnete z delom na napravi, se morate zavedati nevarnosti udara električnega toka, ter tudi poznati preventivne ukrepe za preprečevanje takšnih nevarnosti. Uporabite obrazložitevno številko na koncu posameznega opozorila, da najdete opis nevarnosti v priloženem varnostnem priročniku.

**SHRANITE TE NAPOTKE!****警告****重要安全性指示**

此警告符號代表危險，表示可能造成人身傷害。使用任何設備前，請留心電路相關危險，並熟悉避免意外的標準作法。您可以使用每項警告後的聲明編號，查詢本裝置隨附之安全性警告譯文中的翻譯。請妥善保留此指示

## Related Documentation

The documentation set for the Cisco Unified Computing System (UCS) C-Series rack-mount servers is described in the roadmap document at the following link:

[Cisco UCS C-Series Documentation Roadmap](#)

## Documentation Feedback

To provide technical feedback on this document, or to report an error or omission, please send your comments to [ucs-docfeedback@external.cisco.com](mailto:ucs-docfeedback@external.cisco.com). We appreciate your feedback.

## Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation* at: <http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html>.

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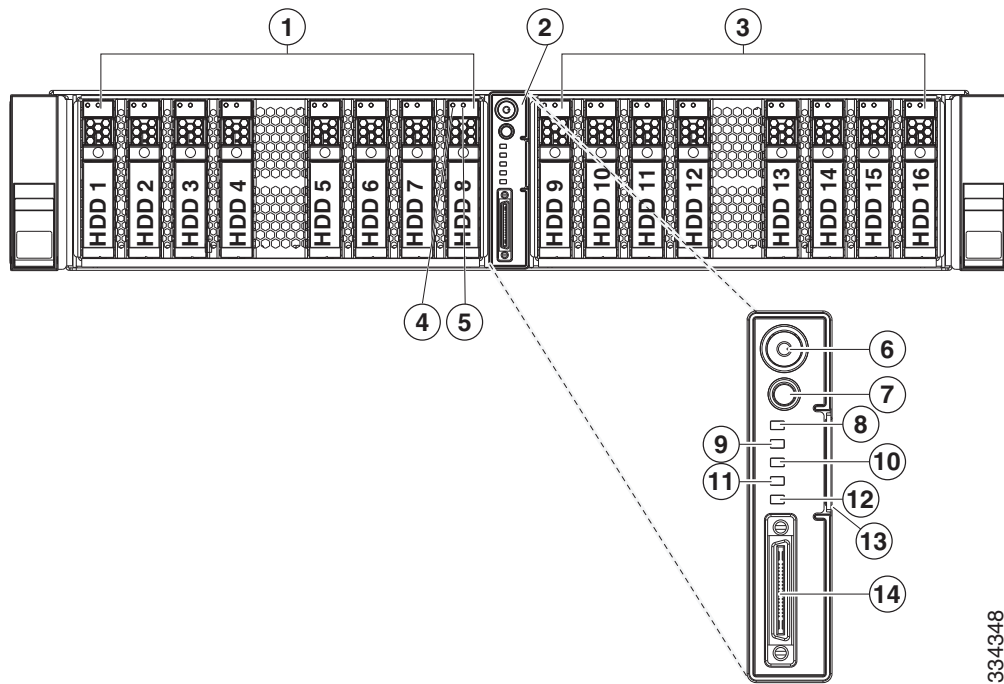
# CHAPTER 1

## Overview of the Cisco UCS C420 Server

This chapter provides an overview of the Cisco UCS C420 server. The figures in this chapter show an overview of external server features. Internal server features are shown in [Figure 3-5 on page 3-10](#).

[Figure 1-1](#) shows the front panel features of the server.

**Figure 1-1** Front Panel Features

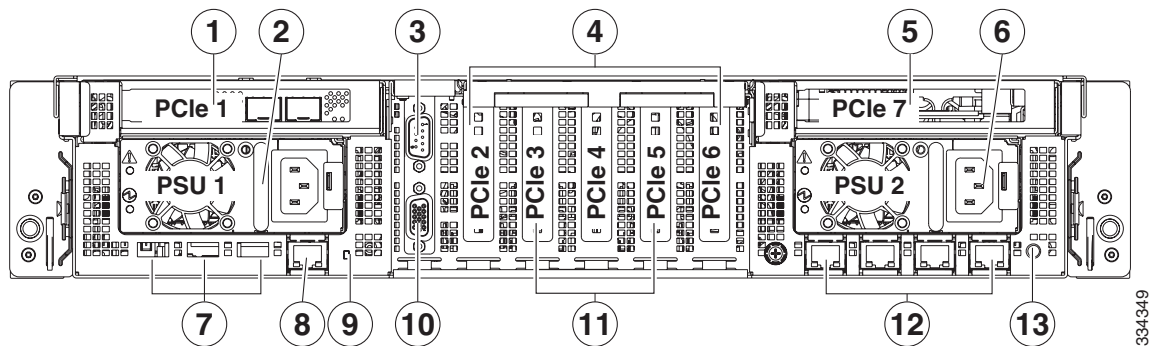


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1	Modular drive bay 1	8	System status LED
2	Operations panel	9	Fan status LED
3	Modular drive bay 2	10	Temperature status LED
4	Hard drive fault LED	11	Power supply status LED
5	Hard drive activity LED	12	Network link activity LED
6	Power button/LED	13	Asset tag (serial number)
7	Identification button and LED	14	KVM console connector (used with a KVM cable that provides two USBs, one VGA, and one serial connector)

Figure 1-2 shows the rear panel features of the server.

**Figure 1-2 Rear Panel Features**



<b>1</b>	Horizontal PCIe slot 1 on riser card (full-height, half-length, x16, with NCSI)	<b>9</b>	Rear system fault LED
<b>2</b>	Power supply 1	<b>10</b>	VGA video connector
<b>3</b>	RS-232 serial connector	<b>11</b>	<i>Optional</i> RAID controller cards (up to 2, supported in designated PCIe slots 3 and 5)
<b>4</b>	PCIe slots 2 through 6 on motherboard (five half-height, half-length, x8 slots). PCIe slot 4 supports NCSI.	<b>12</b>	1-Gb Base-T LOM ports (four, RJ-45)
<b>5</b>	Horizontal PCIe slot 7 on riser card (full-height, half-length, x16, with NCSI)	<b>13</b>	Rear identification button and LED
<b>6</b>	Power supply 2		
<b>7</b>	USB 2.0 ports (three)		
<b>8</b>	10/100/1000 dedicated management Ethernet port (RJ-45)		



Table 1-1 lists the features of the server.

**Table 1-1 Cisco UCS C420 Server Features**

Chassis	Two rack-unit (2RU) chassis.
Processors	Two or four Intel Xeon E5-4600 Series processors.
Memory	The server has 48 DIMM sockets on the motherboard. Each of the four CPUs can support 12 DIMMs.
Multi-bit error protection	This server supports multi-bit error protection.
Storage	Drives are installed into configurable (one or two) drive bay modules that provide hot-pluggable front-panel access.  Each drive bay module can hold up to eight 2.5-inch SAS <sup>1</sup> or SATA <sup>2</sup> hard drives or solid state drives, for a total of 16 drives.  The server also includes an internal USB 2.0 port on the motherboard.  The server also includes two internal bays for SD cards.
Disk Management	For a list of supported RAID controller options, see <a href="#">RAID Controller Considerations, page C-1</a> .  There are also two mounting points inside the chassis for the optional LSI RAID battery backup units that can be used with the controller cards.
RAID Backup	There are two mounting points inside the chassis (on the removable air baffle) that can be used for Supercap power module backup units.
PCIe I/O	Seven PCIe <sup>3</sup> expansion slots: <ul style="list-style-type: none"> <li>• Two full-height, half-length, x16 horizontal slots on riser cards</li> <li>• Five half-height, half-length, x8 slots on motherboard</li> </ul> See <a href="#">Replacing a PCIe Card, page 3-40</a> for slot specifications.
InfiniBand	The bus slots in this server support the InfiniBand architecture.
Network and management I/O	The server provides these rear panel connectors: <ul style="list-style-type: none"> <li>• One 10/100/1000 dedicated management Ethernet port</li> <li>• Four 1-Gb Base-T Ethernet ports</li> <li>• One RS-232 serial connector</li> <li>• One 15-pin VGA<sup>4</sup> connector</li> <li>• Three USB<sup>5</sup> 2.0 connectors</li> </ul> The server also has one front-panel KVM connector that is used with the included KVM cable, which provides two USBs, one VGA, and one serial connector.
WoL	The 1-Gb Base-T Ethernet LAN ports support the wake-on-LAN (WoL) standard.
Power	Two power supplies, 1200 W each. Redundant as 1+1.
ACPI	This server supports the advanced configuration and power interface (ACPI) 4.0 standard.
Cooling	Six fan modules, hot-swappable, redundant.  In addition, there is 1 fan in each power supply.

**Table 1-1 Cisco UCS C420 Server Features (continued)**

Baseboard management	Pilot III BMC, running Cisco Integrated Management Controller (CIMC) firmware. Depending on your CIMC settings, the CIMC can be accessed through the 10/100/1000 dedicated management ports, the 1-Gb LOM ports, or a Cisco virtual interface card.
Video	Resolution up to 1600 x 1200, 16 bpp at 60 Hz. Up to 256 MB of video memory.

1. SAS = serial attached SCSI
2. SATA = serial advanced technology attachment
3. PCIe = peripheral component interconnect express
4. VGA = video graphics array
5. USB = universal serial bus



## CHAPTER 2

# Installing the Server

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This chapter describes how to install the server, and it includes the following sections:

- [Unpacking and Inspecting the Server, page 2-2](#)
- [Preparing for Server Installation, page 2-3](#)
- [Installing the Server In a Rack, page 2-5](#)
- [Initial Server Setup, page 2-8](#)
- [System BIOS and CIMC Firmware, page 2-12](#)
- [Service DIP Switch, page 2-14](#)



### Note

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Before you install, operate, or service a server, review the [Regulatory Compliance and Safety Information for Cisco UCS C-Series Servers](#) for important safety information.

---



### Warning

### IMPORTANT SAFETY INSTRUCTIONS

**This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.**  
Statement 1071

---

SAVE THESE INSTRUCTIONS

# Unpacking and Inspecting the Server


**Caution**

When handling internal server components, wear an ESD strap and handle modules by the carrier edges only.


**Tip**

Keep the shipping container in case the server requires shipping in the future.

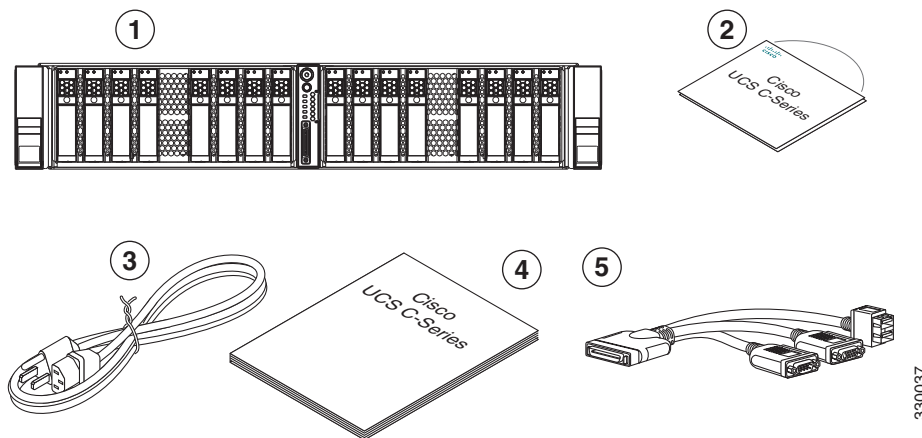

**Note**

The chassis is thoroughly inspected before shipment. If any damage occurred during transportation or any items are missing, contact your customer service representative immediately.

To inspect the shipment, follow these steps:

- Step 1** Remove the server from its cardboard container and save all packaging material.
- Step 2** Compare the shipment to the equipment list provided by your customer service representative and [Figure 2-1](#). Verify that you have all items.
- Step 3** Check for damage and report any discrepancies or damage to your customer service representative. Have the following information ready:
- Invoice number of shipper (see the packing slip)
  - Model and serial number of the damaged unit
  - Description of damage
  - Effect of damage on the installation

**Figure 2-1 Shipping Box Contents**



1	Server	3	Documentation
2	Power cord (up to two)	4	KVM cable

# Preparing for Server Installation

This section provides information about preparing for server installation, and it includes the following topics:

- [Installation Guidelines, page 2-3](#)
- [Rack Requirements, page 2-4](#)
- [Equipment Requirements, page 2-4](#)
- [Slide Rail Adjustment Range, page 2-4](#)

## Installation Guidelines



**Warning**

**To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 35° C (95° F).**

Statement 1047



**Warning**

**The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device.**

Statement 1019



**Warning**

**This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 250 V, 15 A.**

Statement 1005



**Warning**

**Installation of the equipment must comply with local and national electrical codes.**

Statement 1074

When you are installing a server, use the following guidelines:

- Plan your site configuration and prepare the site before installing the server. See the [Cisco UCS Site Preparation Guide](#) for the recommended site planning tasks.
- Ensure that there is adequate space around the server to allow for servicing the server and for adequate airflow. The airflow in this server is from front to back.
- Ensure that the air-conditioning meets the thermal requirements listed in the [Server Specifications](#).
- Ensure that the cabinet or rack meets the requirements listed in the “[Rack Requirements](#)” section on [page 2-4](#).
- Ensure that the site power meets the power requirements listed in the [Server Specifications](#). If available, you can use an uninterruptible power supply (UPS) to protect against power failures.



**Caution**

Avoid UPS types that use ferroresonant technology. These UPS types can become unstable with systems such as the Cisco UCS, which can have substantial current draw fluctuations from fluctuating data traffic patterns.

## Rack Requirements

This section provides the requirements for the standard open racks, assuming an external ambient air temperature range of 41° F to 95° F (5° C to 35° C).

The rack must be of the following type:

- A standard 19-in. (48.3-cm) wide, four-post EIA rack, with mounting posts that conform to English universal hole spacing, per section 1 of ANSI/EIA-310-D-1992.
- The rack post holes can be square 0.38-inch (9.6 mm), round 0.28-inch (7.1 mm), #12-24 UNC, or #10-32 UNC when you use the supplied slide rails.
- The minimum vertical rack space per server must be two RUs, equal to 3.5 in. (88.9 mm).

## Equipment Requirements

The slide rails supplied by Cisco Systems for this server do not require tools for installation if you install them in a rack that has square 0.38-inch (9.6 mm), round 0.28-inch (7.1 mm), or #12-24 UNC threaded holes. The inner rails (mounting brackets) are preattached to the sides of the server.

However, if you install the slide rails in a rack that has #10-32 round holes, a flat-bladed screwdriver is required to remove the larger square or round mounting pegs from the front of the slide rails.

## Slide Rail Adjustment Range

The slide rails for this server have an adjustment range of 26 to 36 inches (660 to 914 mm).

# Installing the Server In a Rack

This section describes how to install the server in a rack.



**Warning**

**To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

**This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**

**When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**

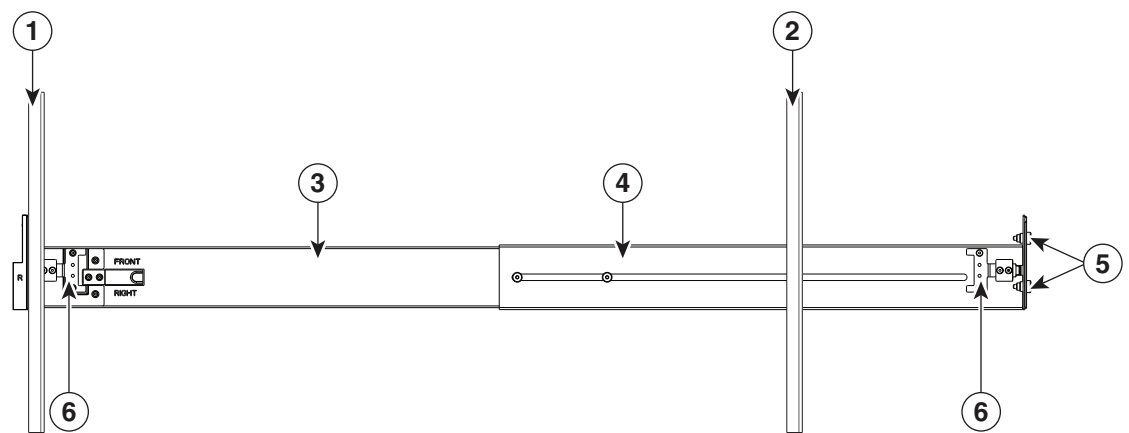
**If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.**  
Statement 1006

To install the slide rails and the server into a rack, follow these steps:

**Step 1** Install the slide rails into the rack (see [Figure 2-2](#)):

- a. Align the slide-rail assembly inside the rack posts with the length-adjustment bracket ([Figure 2-2](#), item 4) toward the rear of the rack.
- b. Compress the length-adjustment bracket until the mounting pegs (item 5) and locking clips (item 6) on the slide-rail assembly engage the desired rack holes on the front and rear rack posts:
  - The mounting pegs fit square 0.38-inch (9.6 mm), round 0.28-inch (7.1 mm), or #12-24 UNC threaded holes. They fit the shape of the hole when the pegs are compressed.
  - The smaller #10-32 round mounting pegs are enclosed in the center of the compressible rear pegs. However, to use the #10-32 pegs, you must use a flat-bladed screwdriver to remove the square or round front pegs.

**Figure 2-2 Attaching a Slide-Rail Assembly to the Rack Posts**



<b>1</b>	Front-right rack post	<b>4</b>	Length-adjustment bracket
<b>2</b>	Rear-right rack post	<b>5</b>	Mounting pegs (two on each end of assembly)
<b>3</b>	Slide-rail assembly	<b>6</b>	Locking clip (one on each end of assembly)

- c. Attach the second slide-rail assembly to the opposite side of the rack. Ensure that the two slide-rail assemblies are level and at the same height with each other.

- d. Pull the inner slide rails on each assembly out toward the rack front until they hit the internal stops and lock in place.

**Step 2** Insert the server into the slide rails (see [Figure 2-3](#)):



**Caution**

This server weighs approximately 86 pounds (39 kilograms) when fully loaded with components. We recommend that you use a minimum of two people when lifting the server. Attempting this procedure alone could result in personal injury or equipment damage.

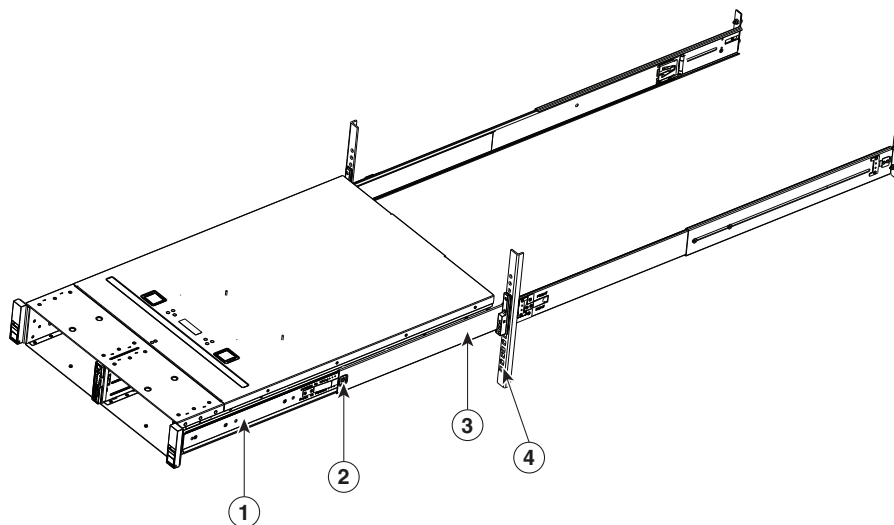


**Note**

The inner rails are preattached to the sides of the server at the factory. You can order replacement inner rails if these are damaged or lost (Cisco PID UCSC-RAIL-2U-I).

- a. Align the inner rails that are attached to the server sides with the front ends of the empty slide rails.
- b. Push the server into the slide rails until it stops at the internal stops.
- c. Push in the slide rail locking clip (item 2) on each inner rail, and then continue pushing the server into the rack until its front flanges latch onto the rack posts.

**Figure 2-3** Inserting the Server into the Slide Rails



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1	Inner rail on server	3	Slide rail assembly on rack post
2	Slide rail locking clip	4	Right-front rack post

**Step 3** Attach the (optional) cable management arm (CMA) to the rear of the slide rails (see [Figure 2-4](#)):



**Note**

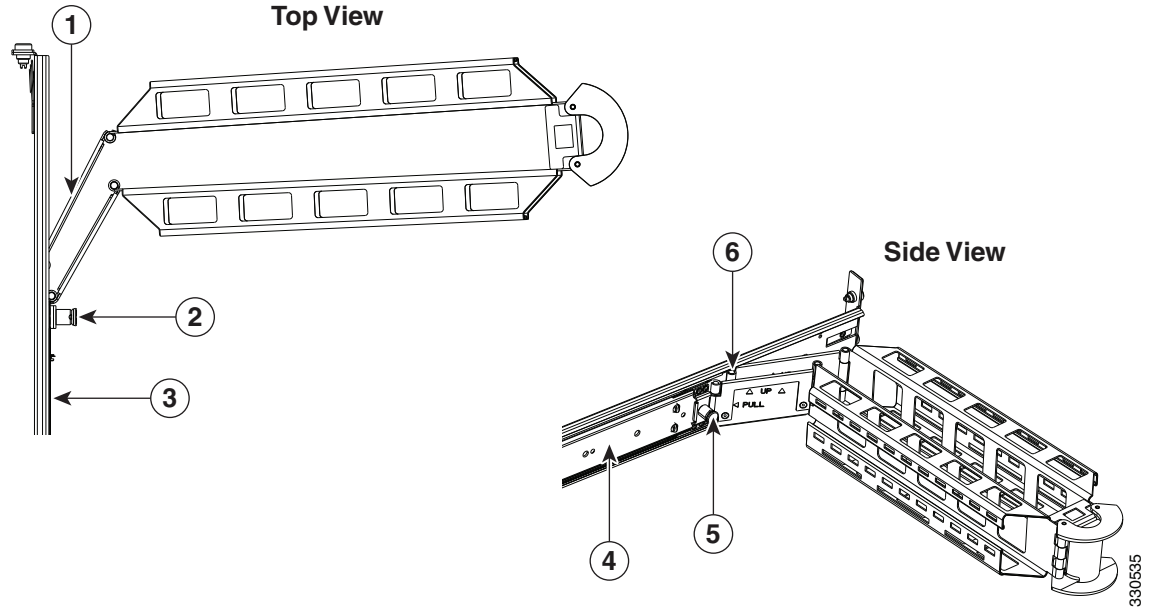
The CMA is reversible left to right so that you can attach it to either slide rail.

- a. With the server pushed fully into the rack, insert the CMA tab that is labeled OUTER RAIL (items 1 and 6) into the clip inside the rear of the outer slide rail. Insert the tab into the clip until it clicks and locks.
- b. Pull outward on the spring-loaded peg that is on the CMA tab that is labeled INNER RAIL (items 2 and 5). You can turn this peg 90 degrees to lock it in the open position.



- c. Push the CMA tab that is labeled INNER RAIL over the end of the inner rail that is attached to the server, and then release the spring-loaded peg. The peg must align with and enter the hole in the mounting bracket to lock the CMA in place.

**Figure 2-4 Attaching the Cable Management Arm**



<b>1</b>	OUTER RAIL CMA tab attached to outer slide rail	<b>4</b>	Rear of left slide rail assembly
<b>2</b>	INNER RAIL CMA tab attached to inner slide rail on server	<b>5</b>	INNER RAIL CMA tab attached to inner slide rail on server
<b>3</b>	Rear of left slide rail assembly	<b>6</b>	OUTER RAIL CMA tab attached to outer slide rail

# Initial Server Setup

This section includes the following topics:

- [Connecting and Powering On the Server \(Standalone Mode\)](#), page 2-8
- [NIC Modes and NIC Redundancy Settings](#), page 2-11

## Connecting and Powering On the Server (Standalone Mode)

This section describes how to power on the server, assign an IP address, and connect to server management when using the server in standalone mode. To use the server in a Cisco UCS integration, specific cabling and settings are required. See [Installation for Cisco UCS Integration](#), page D-1.



### Note

The server is shipped with a default NIC mode called Shared LOM EXT, default NIC redundancy is active-active, and DHCP is enabled. Shared LOM EXT mode enables the 1-Gb Ethernet ports and the ports on any installed Cisco virtual interface card (VIC) to access the Cisco Integrated Management Interface (CIMC). If you want to use the 10/100 dedicated management ports to access the CIMC, you can connect to the server and change the NIC mode as described in [Step 4](#) of the following procedure. In that step, you can also change the NIC redundancy and set static IP settings.

To perform initial setup of the server, follow these steps:

**Step 1** Attach a supplied power cord to each power supply in your server, and then attach the power cord to a grounded AC power outlet. See the [Power Specifications](#), page A-2 for power specifications.

Wait for approximately two minutes to let the server boot in standby power during the first bootup.

You can verify the power status by looking at the Power Status LED (see [Figure 1-1 on page 1-1](#)):

- Off—There is no AC power present in the server.
- Amber—The server is in standby power mode. Power is supplied only to the CIMC and some motherboard functions.
- Green—The server is in main power mode. Power is supplied to all server components.



### Note

During bootup, the server beeps once for each USB device that is attached to the server. Even if there are no external USB devices attached, there is a short beep for each virtual USB device such as a virtual floppy drive, CD/DVD drive, keyboard, or mouse. A beep is also emitted if a USB device is hot-plugged or hot-unplugged during a BIOS power-on self test (POST), or while you are accessing the BIOS Setup utility or the EFI shell.

**Step 2** Connect a USB keyboard and VGA monitor by connecting the supplied KVM cable to the KVM connector on the front panel (see [Figure 1-1 on page 1-1](#)).



### Note

Alternatively, you can use the VGA and USB ports on the rear panel. However, you cannot use the front panel VGA and the rear panel VGA at the same time. If you are connected to one VGA connector and you then connect a video device to the other connector, the first VGA connector is disabled.

**Step 3** Connect Ethernet cables to the server ports or card ports that you want to use.

- Step 4** Set NIC mode and NIC redundancy, and choose whether to enable DHCP or set static network settings:
- a. Press the **Power** button to boot the server. Watch for the prompt to press F8.
  - b. During bootup, press **F8** when prompted to open the BIOS CIMC Configuration Utility.
  - c. Set the NIC mode to your choice for which ports to use to access the CIMC for server management (see [Figure 1-2 on page 1-2](#) for identification of the ports):

- Shared LOM EXT (default)—This is shared LOM extended mode. This is the factory-default setting, along with Active-active NIC redundancy and DHCP-enabled. With this mode, the shared LOM and Cisco Card interfaces are both enabled.

In this mode, DHCP replies are returned to both the shared LOM ports and the Cisco card ports. If the system determines that the Cisco card connection is not getting its IP address from a Cisco UCS Manager system because the server is in standalone mode, further DHCP requests from the Cisco card are disabled. Use the Cisco Card NIC mode if you want to connect to the CIMC through a Cisco card in standalone mode.

- Dedicated—The 10/100 management port is used to access the CIMC. You must select a NIC redundancy and IP setting.
- Shared LOM—The 1-Gb Ethernet ports are used to access the CIMC. You must select a NIC redundancy and IP setting.
- Cisco Card—The ports on an installed Cisco UCS virtual interface card (VIC) are used to access the CIMC. You must select a NIC redundancy and IP setting.



**Note** Cisco Card NIC mode is currently supported only with a Cisco UCS VIC that is installed in PCIe slot 1, 4, or 7. See also [Special Considerations for Cisco UCS Virtual Interface Cards, page 3-45](#).

- d. Use this utility to change the NIC redundancy to your preference. This server has three possible NIC redundancy settings:
  - None—(Available only with the *Shipping* NIC mode) The Ethernet ports operate independently and do not fail over if there is a problem.
  - Active-standby—If an active Ethernet port fails, traffic fails over to a standby port.
  - Active-active—All Ethernet ports are used simultaneously. See [NIC Modes and NIC Redundancy Settings, page 2-11](#) for more information.
- e. Choose whether to enable DHCP for dynamic network settings, or to enter static network settings.



**Note** Before you enable DHCP, your DHCP server must be preconfigured with the range of MAC addresses for this server. The MAC address is printed on a label on the rear of the server. This server has a range of six MAC addresses that are assigned to the CIMC. The MAC address printed on the label is the beginning of the range of six contiguous MAC addresses.

- f. (Optional) Use this utility to make VLAN settings, and to set a default CIMC user password.



**Note** Changes to the settings take effect after approximately 45 seconds. Press **F5** to refresh the screen and wait until the new settings appear before you reboot the server in the next step.

- g. Press **F10** to save your settings and reboot the server.



---

**Note** If you chose to enable DHCP, the dynamically assigned IP and MAC addresses are displayed on the console screen during bootup.

---

**Step 5** Use a browser and the IP address of the CIMC to connect to the CIMC Setup Utility. The IP address is based upon the settings that you made in [Step 4](#) (either a static address or the address assigned by your DHCP server).



---

**Note** The default user name for the server is *admin*. The default password is *password*.

---

To manage the server, see the *Cisco UCS C-Series Rack-Mount Server Configuration Guide* or the *Cisco UCS C-Series Rack-Mount Server CLI Configuration Guide* for instructions on using those interfaces. The links to these documents are in the C-Series documentation roadmap:

<http://www.cisco.com/go/unifiedcomputing/c-series-doc>

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## NIC Modes and NIC Redundancy Settings

This server has the following NIC mode settings that you can choose from:

- Shared LOM EXT (default)—This is shared LOM extended mode. This is the factory default setting, along with Active-active NIC redundancy and DHCP-enabled. With this mode, the shared LOM and Cisco Card interfaces are both enabled.



---

**Note** In this mode, DHCP replies are returned to both the shared LOM ports and the Cisco card ports. If the system determines that the Cisco card connection is not getting its IP address from a Cisco UCS Manager system because the server is in standalone mode, further DHCP requests from the Cisco card are disabled. If the system determines that the Cisco card connection is getting its IP address from a Cisco UCS Manager system, the reply has parameters that automatically move the server to UCSM mode.

---

- Dedicated—The 10/100 management port is used to access the CIMC. You must select a NIC redundancy and IP setting.
- Shared LOM—The 1-Gb Ethernet ports are used to access the CIMC. You must select a NIC redundancy and IP setting.
- Cisco Card—The ports on an installed Cisco UCS virtual interface card (VIC) are used to access the CIMC. You must select a NIC redundancy and IP setting.



---

**Note** The Cisco Card NIC mode is currently supported only with a Cisco UCS VIC that is installed in PCIe slot 1, 4, or 7. See also [Special Considerations for Cisco UCS Virtual Interface Cards](#), page 3-45.

---

This server has the following NIC redundancy settings that you can choose from:

- None—The Ethernet ports operate independently and do not fail over if there is a problem.
- Active-standby—If an active Ethernet port fails, traffic fails over to a standby port.
- Active-active—All Ethernet ports are used simultaneously.

The active/active setting uses Mode 5 or Balance-TLB (adaptive transmit load balancing). This is channel bonding that does not require any special switch support. The outgoing traffic is distributed according to the current load (computed relative to the speed) on each slave. Incoming traffic is received by the current slave. If the receiving slave fails, another slave takes over the MAC address of the failed receiving slave.

# System BIOS and CIMC Firmware

This section includes information about the system BIOS and it includes the following topics:

- [Updating the BIOS and CIMC Firmware, page 2-12](#)
- [Accessing the System BIOS, page 2-13](#)

## Updating the BIOS and CIMC Firmware

**Caution**

---

When you upgrade the BIOS firmware, you must also upgrade the CIMC firmware to the same version or the server does not boot. Do not power off the server until the BIOS and CIMC firmware match or the server does not boot.

---

The server uses firmware that is obtained from and certified by Cisco. Cisco provides release notes with each firmware image. There are several methods for updating the firmware:

- **Recommended method for systems running firmware level 1.2 or later**—Use the Cisco Host Upgrade Utility to simultaneously upgrade the CIMC, BIOS, LOM, LSI storage controller, and Cisco UCS VIC firmware to compatible levels.

See the *Cisco Host Upgrade Utility Quick Reference Guide* for your firmware level at the documentation roadmap link that is listed in this section.

**Note**

---

Your system firmware must be at minimum level 1.2 to use the Cisco Host Upgrade Utility. If your firmware is prior to level 1.2, you must use the methods listed in this section to update the BIOS and CIMC firmware individually.

---

- You can upgrade the BIOS using the EFI interface, or upgrade from a Windows or Linux platform. See the *Cisco UCS C-Series Rack-Mount Server BIOS Upgrade Guide*.
- You can upgrade the CIMC firmware by using the CIMC GUI interface. See the *Cisco UCS C-Series Rack-Mount Server Configuration Guide*.
- You can upgrade the CIMC firmware by using the CIMC CLI interface. See the *Cisco UCS C-Series Rack-Mount Server CLI Configuration Guide*.

For links to the documents listed above, see the documentation roadmap at the following URL:

<http://www.cisco.com/go/unifiedcomputing/c-series-doc>

## Accessing the System BIOS

To change the BIOS settings for your server, follow these steps. Detailed instructions are also printed on the BIOS screens.

---

**Step 1** Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.



---

**Note** The version and build of the current BIOS are displayed on the Main page of the utility.

---

**Step 2** Use the arrow keys to select the BIOS menu page.

**Step 3** Highlight the field to be modified by using the arrow keys.

**Step 4** Press **Enter** to select the field that you want to change, and then modify the value in the field.

**Step 5** Press the right arrow key until the Exit menu screen is displayed.

**Step 6** Follow the instructions on the Exit menu screen to save your changes and exit the setup utility (or press **F10**). You can exit without saving changes by pressing **Esc**.

---

# Service DIP Switch

This server includes a DIP switch on the I/O riser that you can use to recover from a corrupted BIOS.

This section includes the following topics:

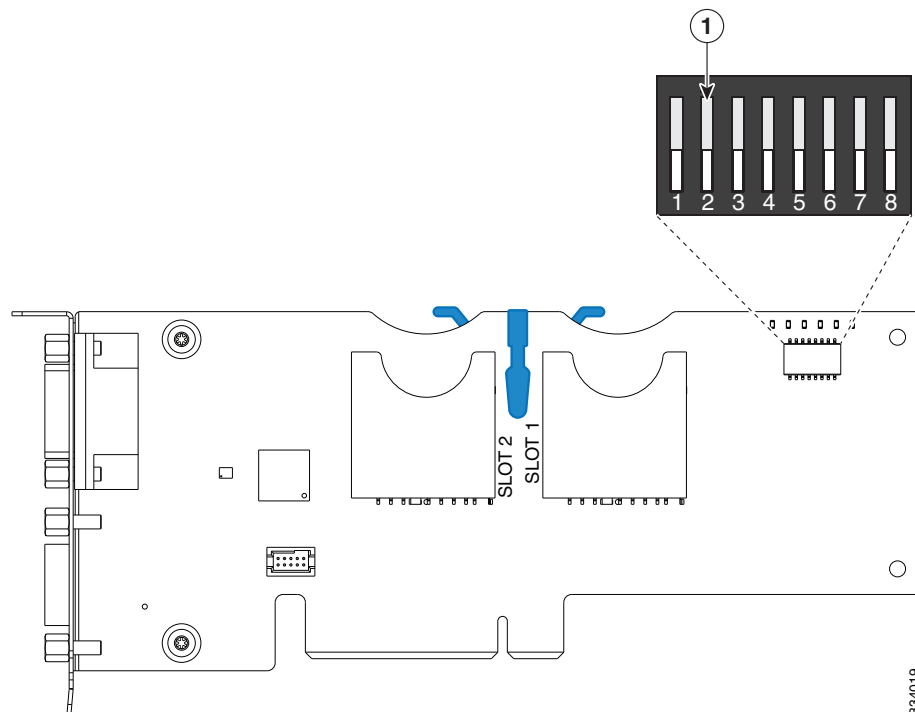
- [DIP Switch Location on the I/O Riser, page 2-14](#)
- [Using the BIOS Recovery DIP Switch, page 2-15](#)

## DIP Switch Location on the I/O Riser

The block of DIP switches is located on the I/O riser (see [Figure 2-5](#)). The default position for all switches is open (down).

The I/O riser is the removable card that includes the rear-panel serial and VGA connectors. See [Figure 3-5](#) for the location of the I/O riser in the server.

**Figure 2-5** DIP Switches on I/O Riser



- |          |  |
|----------|--|
| <b>1</b> | DIP switch 2 for BIOS recovery<br>(shown in default open position) |
|----------|--|



## Using the BIOS Recovery DIP Switch

Depending on which stage the BIOS becomes corrupted, you might see different behavior.

- If the BIOS BootBlock is corrupted, you might see the system get stuck on the following message:

```
Initializing and configuring memory/hardware
```

- If it is a non-BootBlock corruption, the following message is displayed:

```
****BIOS FLASH IMAGE CORRUPTED****
Flash a valid BIOS capsule file using CIMC WebGUI or CLI interface.
IF CIMC INTERFACE IS NOT AVAILABLE, FOLLOW THE STEPS MENTIONED BELOW.
1. Connect the USB stick with recovery.cap file in root folder.
2. Reset the host.
IF THESE STEPS DO NOT RECOVER THE BIOS
1. Power off the system.
2. Mount recovery jumper.
3. Connect the USB stick with recovery.cap file in root folder.
4. Power on the system.
Wait for a few seconds if already plugged in the USB stick.
REFER TO SYSTEM MANUAL FOR ANY ISSUES.
```



### Note

As indicated by the message shown above, there are two procedures for recovering the BIOS. Try procedure 1 first, then if that does not recover the BIOS, use procedure 2.



### Note

The server must have CIMC version 1.4(6) or later to use these procedures.

### Procedure 1: Reboot With recovery.cap File

**Step 1** Download the BIOS update package and extract it to a temporary location.

**Step 2** Copy the contents of the extracted `recovery` folder to the root directory of a USB thumb drive. The `recovery` folder contains the `recovery.cap` file that is required in this procedure.



### Note

The `recovery.cap` file must be in the root directory of the USB thumb drive. Do not rename this file. The USB thumb drive must be formatted with either FAT16 or FAT32 file systems.

**Step 3** Insert the USB thumb drive into a USB port on the server.

**Step 4** Reboot the server.

**Step 5** Return the server to main power mode by pressing the **Power** button on the front panel.

The server boots with the updated BIOS boot block. When the BIOS detects a valid `recovery.cap` file on the USB thumb drive, it displays this message:

```
Found a valid recovery file...Transferring to CIMC
System would flash the BIOS image now...
System would restart with recovered image after a few seconds...
```

**Step 6** Wait for server to complete the BIOS update, then remove the USB thumb drive from the server.



### Note

During the BIOS update, the CIMC will shut down the server and the screen will be blank for about 10 minutes. Do not unplug the power cords during this update. The CIMC will power on the server after the update is complete.

## Procedure 2: Use BIOS Recovery DIP Switch and recovery.cap File

- Step 1** Download the BIOS update package and extract it to a temporary location.
- Step 2** Copy the contents of the extracted `recovery` folder to the root directory of a USB thumb drive. The `recovery` folder contains the `recovery.cap` file that is required in this procedure.



**Note** The `recovery.cap` file must be in the root directory of the USB thumb drive. Do not rename this file. The USB thumb drive must be formatted with either FAT16 or FAT32 file systems.

- Step 3** Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
- Step 4** Disconnect all power cords from the power supplies.
- Step 5** Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.



**Caution** If you cannot safely view and access the component, remove the server from the rack.

- Step 6** Remove the top cover as described in [Removing and Replacing the Server Top Cover, page 3-9](#).
- Step 7** Locate BIOS recovery DIP switch 2. See [Figure 2-5](#).
- Step 8** Use a small pointed object such as a screwdriver to move DIP switch 2 to the closed (upper) position.
- Step 9** Reconnect AC power cords to the server. The server powers up to standby power mode.
- Step 10** Insert the USB thumb drive that you prepared in [Step 2](#) into a USB port on the server.
- Step 11** Return the server to main power mode by pressing the **Power** button on the front panel.

The server boots with the updated BIOS boot block. When the BIOS detects a valid `recovery.cap` file on the USB thumb drive, it displays this message:

```
Found a valid recovery file...Transferring to CIMC
System would flash the BIOS image now...
System would restart with recovered image after a few seconds...
```

- Step 12** Wait for server to complete the BIOS update, then remove the USB thumb drive from the server.



**Note** During the BIOS update, the CIMC will shut down the server and the screen will be blank for about 10 minutes. Do not unplug the power cords during this update. The CIMC will power on the server after the update is complete.

- Step 13** After the server has fully booted, power off the server again and disconnect all power cords.
- Step 14** Move DIP switch 2 back to the default open (lower) position.



**Note** If you do not move the switch back to the default position, the CIMC attempts to recover the BIOS each time that you boot the server.

- Step 15** Replace the top cover, replace the server in the rack, replace power cords and any other cables, and then power on the server by pressing the **Power** button.



## CHAPTER 3

# Maintaining the Server

---

This chapter describes how to diagnose server system problems using LEDs. It also provides information about how to install or replace hardware components, and it includes the following sections:

- [Server Monitoring and Management Tools, page 3-1](#)
- [Status LEDs and Buttons, page 3-2](#)
- [Preparing for Server Component Installation, page 3-8](#)
- [Installing or Replacing Server Components, page 3-11](#)

## Server Monitoring and Management Tools

### Cisco Integrated Management Interface

You can monitor the server inventory, health, and system event logs by using the built-in Cisco Integrated Management Controller (CIMC) GUI or CLI interfaces. See the user documentation for your firmware release at the following URL:

[http://www.cisco.com/en/US/products/ps10739/products\\_installation\\_and\\_configuration\\_guides\\_list.html](http://www.cisco.com/en/US/products/ps10739/products_installation_and_configuration_guides_list.html)

### Server Configuration Utility

Cisco has also developed the Cisco Server Configuration Utility for C-Series servers, which can aid and simplify the following tasks:

- Monitoring server inventory and health
- Diagnosing common server problems with diagnostic tools and logs
- Setting the BIOS booting order
- Configuring some RAID configurations
- Installing operating systems

You can download the ISO from Cisco.com. See the user documentation for this utility at the following URL:

[http://www.cisco.com/en/US/docs/unified\\_computing/ucs/sw/ucsscu/user/guide/20/SCUUG20.html](http://www.cisco.com/en/US/docs/unified_computing/ucs/sw/ucsscu/user/guide/20/SCUUG20.html)

# Status LEDs and Buttons

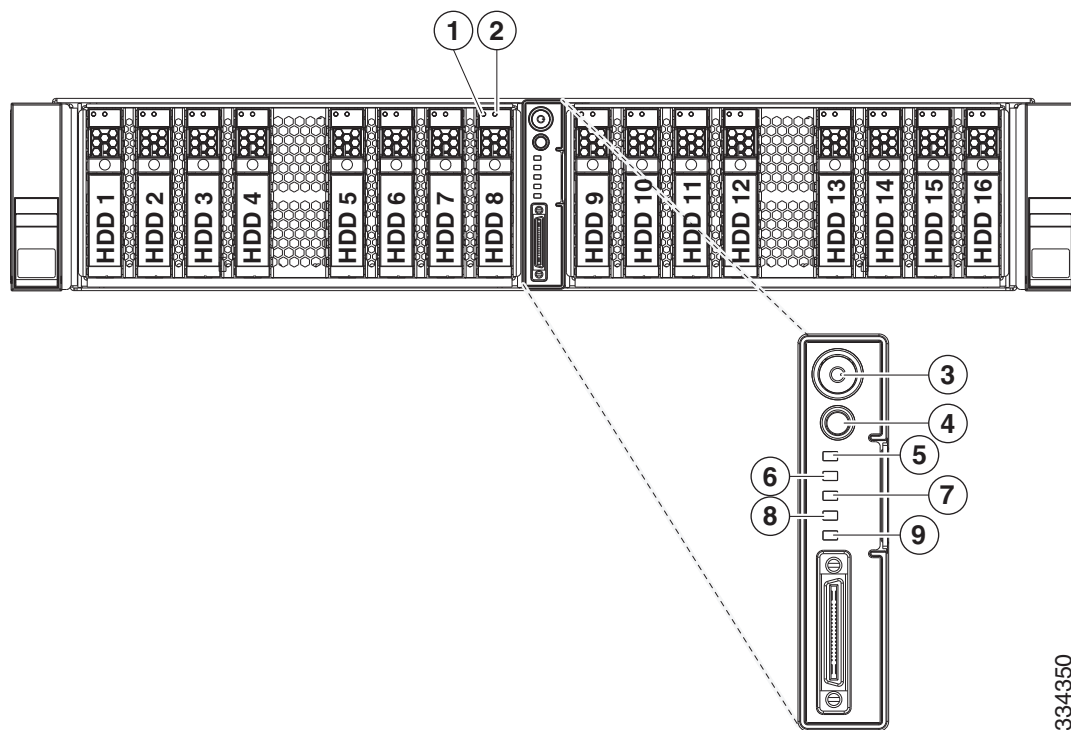
This section describes the location and meaning of LEDs and buttons and includes the following topics:

- [Front-Panel LEDs, page 3-2](#)
- [Rear-Panel LEDs and Buttons, page 3-4](#)
- [Internal Diagnostic LEDs, page 3-7](#)

## Front-Panel LEDs

Figure 3-1 shows the front-panel LEDs. Table 3-1 on page 3-3 defines the front-panel LED states.

**Figure 3-1** Front-Panel LEDs



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1	Hard drive fault LED	6	Fan status LED
2	Hard drive activity LED	7	Temperature status LED
3	Power button and Power status LED	8	Power supply status LED
4	Identification button and LED	9	Network link activity LED
5	System status LED		

**Table 3-1 Front-Panel LEDs States**

LED Name	State
Hard drive activity	<ul style="list-style-type: none"> <li>• Off—There is no hard drive in the hard drive tray (no access, no fault).</li> <li>• Green—The hard drive is ready.</li> <li>• Green, blinking—The hard drive is reading or writing data.</li> </ul>
Hard drive fault	<ul style="list-style-type: none"> <li>• Off—The hard drive is operating properly.</li> <li>• Amber—This hard drive has failed.</li> <li>• Amber, blinking—The device is rebuilding.</li> </ul>
Power button/Power status LED	<ul style="list-style-type: none"> <li>• Off—There is no AC power to the server.</li> <li>• Amber—The server is in standby power mode. Power is supplied only to the CIMC and some motherboard functions.</li> <li>• Green—The server is in main power mode. Power is supplied to all server components.</li> </ul>
Identification	<ul style="list-style-type: none"> <li>• Off—The Identification LED is not in use.</li> <li>• Blue—The Identification LED is activated.</li> </ul>
System status	<ul style="list-style-type: none"> <li>• Green—The server is running in normal operating condition.</li> <li>• Green, blinking—The server is performing system initialization and memory check.</li> <li>• Amber, steady—The server is in a degraded operational state. For example: <ul style="list-style-type: none"> <li>– Power supply redundancy is lost.</li> <li>– CPUs are mismatched.</li> <li>– At least one CPU is faulty.</li> <li>– At least one DIMM is faulty.</li> <li>– At least one drive in a RAID configuration failed.</li> </ul> </li> <li>• Amber, blinking—The server is in a critical fault state. For example: <ul style="list-style-type: none"> <li>– Boot failed.</li> <li>– Fatal CPU and/or bus error is detected.</li> <li>– Server is in an over-temperature condition.</li> </ul> </li> </ul>
Fan status	<ul style="list-style-type: none"> <li>• Green—All fan modules are operating properly.</li> <li>• Amber, steady—One fan module has failed.</li> <li>• Amber, blinking—Critical fault; two or more fan modules have failed.</li> </ul>
Temperature status	<ul style="list-style-type: none"> <li>• Green—The server is operating at normal temperature.</li> <li>• Amber, steady—One or more temperature sensors have exceeded a warning threshold.</li> <li>• Amber, blinking—One or more temperature sensors have exceeded a critical threshold.</li> </ul>

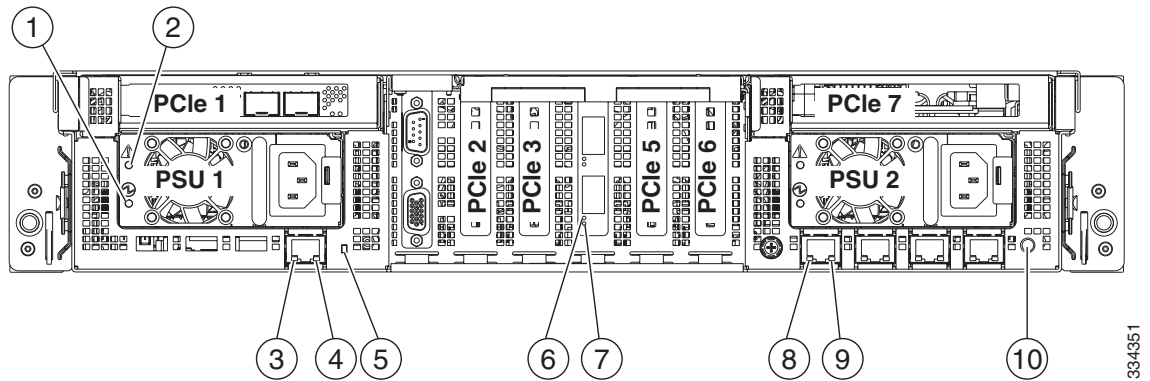
Table 3-1 Front-Panel LEDs States (continued)

LED Name	State
Power supply status	<ul style="list-style-type: none"> <li>Green—All power supplies are operating normally.</li> <li>Amber, steady—One or more power supplies are in a degraded operational state.</li> <li>Amber, blinking—One or more power supplies are in a critical fault state.</li> </ul>
Network link activity	<ul style="list-style-type: none"> <li>Off—The Ethernet link is idle.</li> <li>Green—One or more Ethernet LOM ports are link-active.</li> </ul>

## Rear-Panel LEDs and Buttons

Figure 3-2 shows the rear-panel LEDs and buttons. Table 3-2 on page 3-5 defines the rear-panel LED states.

Figure 3-2 Rear-Panel LEDs and Buttons



1	Power supply status	6	10-Gb Ethernet link status (present only if 10-Gb VIC is installed)
2	Power supply fault	7	10-Gb Ethernet link speed (present only if 10-Gb VIC is installed)
3	10/100/1000 Ethernet link speed	8	1-Gb Ethernet link speed
4	10/100/1000 Ethernet link status	9	1-Gb Ethernet link status
5	System status	10	Rear identification button and LED

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**Table 3-2** Rear-Panel LED States

LED Name	State
Power supply status	<ul style="list-style-type: none"> <li>Green, steady—The power supply is operating normally and supplying AC power to the server.</li> <li>Green, blinking—The power supply is off and in cold-redundancy mode.</li> </ul>
Power supply fault	<ul style="list-style-type: none"> <li>Off—The power supply is operating normally.</li> <li>Amber, blinking—An event warning threshold has been reached, but the power supply continues to operate.</li> <li>Amber, steady—A critical fault threshold has been reached, causing the power supply to shut down.</li> </ul>
10/100/1000 Ethernet link speed	<ul style="list-style-type: none"> <li>Off—Link speed is 10 Mbps.</li> <li>Green—Link speed is 100 Mbps.</li> </ul>
10/100/1000 Ethernet link status	<ul style="list-style-type: none"> <li>Off—No link is present.</li> <li>Green—Link is active.</li> <li>Green, blinking—Traffic is present on the active link.</li> </ul>
System status	<ul style="list-style-type: none"> <li>Green—The server is running in normal operating condition.</li> <li>Green, blinking—The server is performing system initialization and memory check.</li> <li>Amber, steady—The server is in a degraded operational state. For example: <ul style="list-style-type: none"> <li>Power supply redundancy is lost.</li> <li>CPUs are mismatched.</li> <li>At least one CPU is faulty.</li> <li>At least one DIMM is faulty.</li> <li>At least one drive in a RAID configuration failed.</li> </ul> </li> <li>Amber, blinking—The server is in a critical fault state. For example: <ul style="list-style-type: none"> <li>Boot failed.</li> <li>Fatal CPU and/or bus error is detected.</li> <li>Server is in an over-temperature condition.</li> </ul> </li> </ul>
10-Gb Ethernet link speed	<ul style="list-style-type: none"> <li>Off—Link speed is 10 Mbps.</li> <li>Green—Link speed is 10 Gbps.</li> </ul>
10-Gb Ethernet link status	<ul style="list-style-type: none"> <li>Off—No link is present.</li> <li>Green—Link is active.</li> <li>Green, blinking—Traffic is present on the active link.</li> </ul>
1-Gb Ethernet link speed	<ul style="list-style-type: none"> <li>Off—Link speed is 10 Mbps.</li> <li>Amber—Link speed is 100 Mbps.</li> <li>Green—Link speed is 1 Gbps.</li> </ul>

**Table 3-2**      *Rear-Panel LED States (continued)*

<b>LED Name</b>	<b>State</b>
1-Gb Ethernet link status	<ul style="list-style-type: none"><li>• Off—No link is present.</li><li>• Green—Link is active.</li><li>• Green, blinking—Traffic is present on the active link.</li></ul>
Identification	<ul style="list-style-type: none"><li>• Off—The identification LED is not in use.</li><li>• Blue—The identification LED is activated.</li></ul>

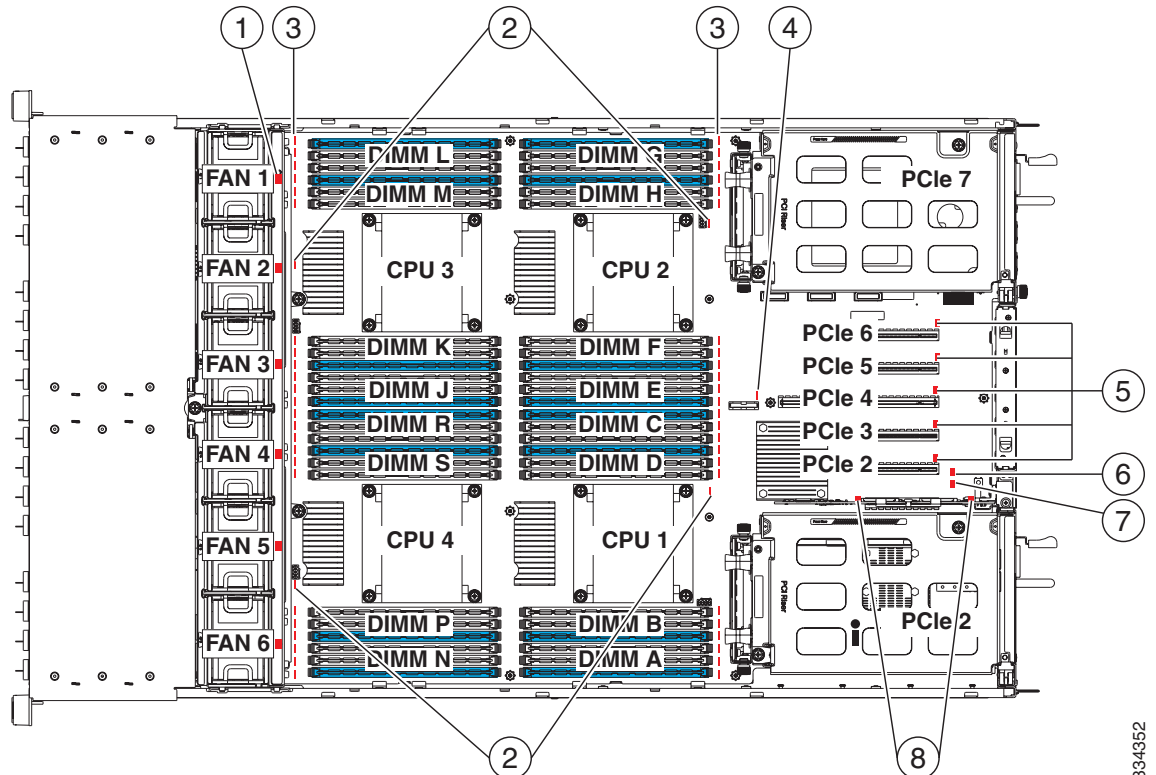


## Internal Diagnostic LEDs

The server is equipped with a supercap voltage source that can activate internal component fault LEDs up to 30 minutes after AC power is removed. The server has internal fault LEDs for fan modules, CPU sockets, DIMM sockets, the motherboard RTC battery, PCIe sockets, TPM socket, I/O riser socket, and SD cards.

To use these LEDs to identify a failed component, press the front or rear identification button with AC power removed (see [Figure 3-1](#) or [Figure 3-2](#) for the identification button location). See [Figure 3-3](#) for the locations of these internal LEDs.

**Figure 3-3** Internal Diagnostic LED Locations



<b>1</b>	Fan module fault LEDs (one on each fan)	<b>5</b>	PCIe card fault LEDs (one for each PCIe socket on motherboard)
<b>2</b>	CPU fault LEDs on motherboard: <ul style="list-style-type: none"> <li>• CPU1 LED = CR69</li> <li>• CPU2 LED = CR68</li> <li>• CPU3 LED = CR42</li> <li>• CPU4 LED = CR43</li> </ul>	<b>6</b>	TPM fault LED on motherboard (CR40)
<b>3</b>	DIMM fault LEDs on motherboard (one for each DIMM socket)	<b>7</b>	I/O riser fault LED on motherboard (CR39)
<b>4</b>	RTC battery fault LED on motherboard	<b>8</b>	SD card fault LEDs on I/O riser

**Table 3-3** Internal Diagnostic LED States

LED Name	State
Internal diagnostic LEDs (all)	<ul style="list-style-type: none"> <li>• Off—Component is functioning normally.</li> <li>• Amber—Component has failed.</li> </ul>

# Preparing for Server Component Installation

This section describes how to prepare for component installation, and it includes the following topics:

- [Required Equipment, page 3-8](#)
- [Shutting Down and Powering Off the Server, page 3-8](#)
- [Removing and Replacing the Server Top Cover, page 3-9](#)
- [Replaceable Component Locations, page 3-10](#)
- [Color-Coded Touch Points, page 3-11](#)

## Required Equipment

The following equipment is used to perform the procedures in this chapter:

- Number 1 Phillips-head screwdriver
- Number 2 Phillips-head screwdriver
- Number 10 Torx screwdriver
- Electrostatic discharge (ESD) strap or other grounding equipment such as a grounded mat

## Shutting Down and Powering Off the Server

The server can run in two power modes:

- Main power mode—Power is supplied to all server components and any operating system on your hard drives can run.
- Standby power mode—Power is supplied only to the service processor and the cooling fans and it is safe to power off the server from this mode.

You can invoke a graceful shutdown or a hard shutdown by using either the CIMC management interface or the Power button on the front panel.

To use the Power button, follow these steps:

- 
- Step 1** Check the color of the Power Status LED (see the [“Front-Panel LEDs” section on page 3-2](#)).
- Green—The server is in main power mode and must be shut down before it can be safely powered off. Go to [Step 2](#).
  - Amber—The server is already in standby mode and can be safely powered off. Go to [Step 3](#).

- Step 2** Invoke either a graceful shutdown or a hard shutdown:



### Caution

To avoid data loss or damage to your operating system, you should always invoke a graceful shutdown of the operating system.

- Graceful shutdown—Press and release the **Power** button. The operating system performs a graceful shutdown and the server goes to standby mode, which is indicated by an amber Power Status LED.
- Emergency shutdown—Press and hold the **Power** button for 4 seconds to force the main power off and immediately enter standby mode.

- Step 3** Disconnect the power cords from the power supplies in your server to completely power off the server.
-

## Removing and Replacing the Server Top Cover

To remove or replace the top cover of the server, follow these steps:


**Tip**

You do not have to remove the cover to replace hard drives or power supplies.

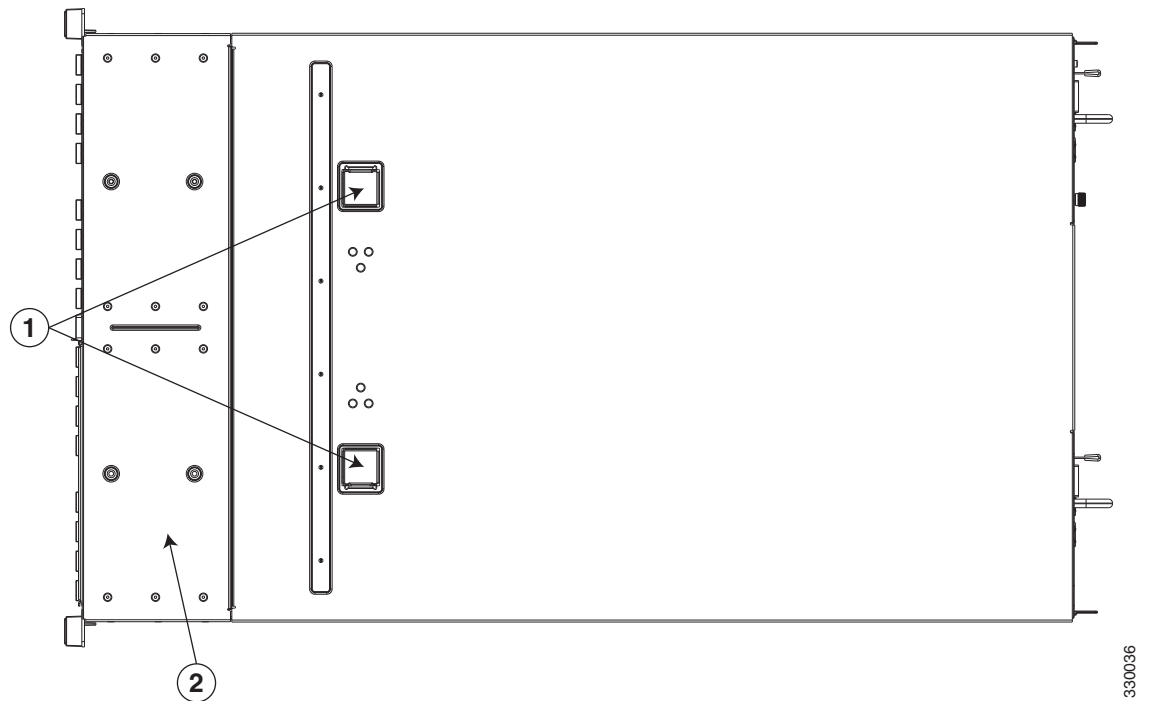
**Step 1** Remove the top cover:

- a. Simultaneously press the two release buttons. See [Figure 3-4](#).
- b. Push the top cover toward the server rear about one-half inch (1.27 cm), until it stops.
- c. Lift the top cover straight up from the server and set it aside.

**Step 2** Replace the top cover:

- a. Place the cover on top of the server about one-half inch (1.27 cm) behind the lip of the chassis front cover panel. The cover should sit flat when the edge flanges are sitting in the grooves in the chassis.
- b. Slide the top cover toward the front cover panel until it stops and the release buttons lock.

**Figure 3-4** Removing the Top Cover



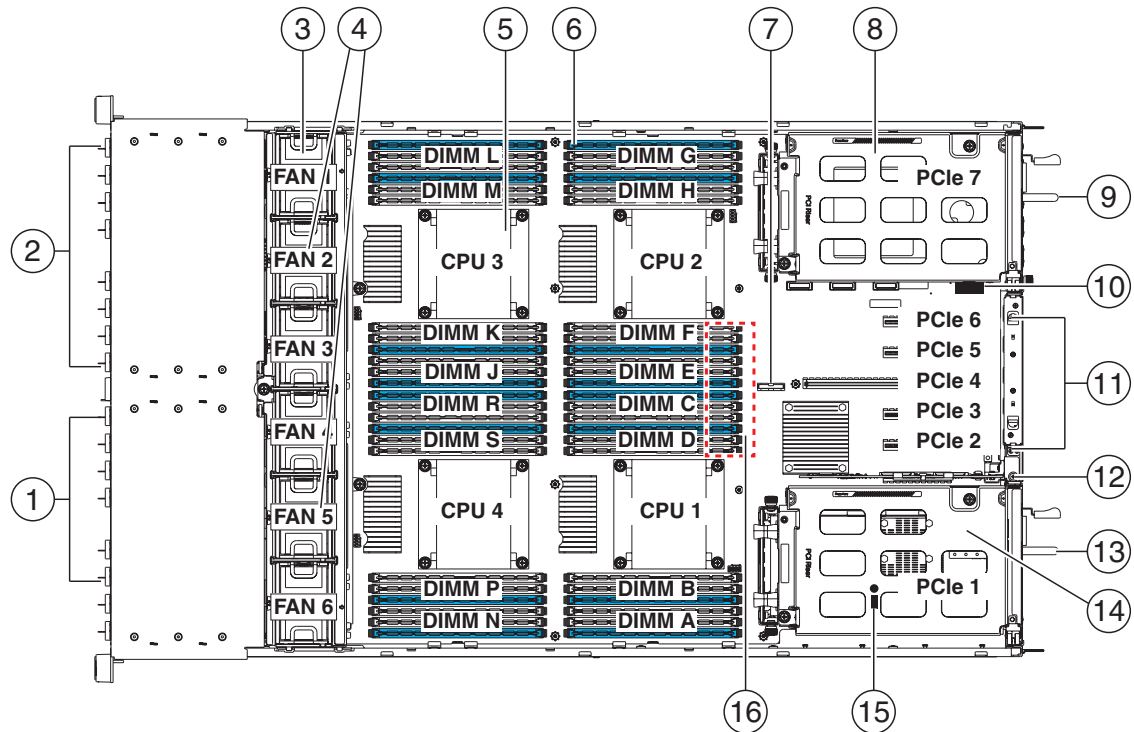
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<b>1</b>	Release buttons	<b>2</b>	Front cover panel
----------	-----------------	----------	-------------------

## Replaceable Component Locations

This section shows the locations of the components that are discussed in this chapter. The view in [Figure 3-5](#) is from the top down with the top cover removed.

**Figure 3-5** Replaceable Component Locations



1	Drive bay module 2 (up to eight 2.5-inch drives, hot-pluggable)	9	Power supply 2 (hot-pluggable)
2	Drive bay module 1 (up to eight 2.5-inch drives, hot-pluggable)	10	USB 2.0 slot on motherboard
3	Fan tray, with six hot-pluggable fan modules	11	PCIe slots 2–6 on motherboard See also <a href="#">Figure 3-23</a> on page 3-40 for details.
4	Drive backplane transition cards (up to two on chassis floor, not visible under fan tray in this view)	12	I/O riser (includes two sockets for SD cards)
5	CPUs and heatsinks (two or four)	13	Power supply 1 (hot-pluggable)
6	DIMM sockets on motherboard (up to 48)	14	PCIe riser 2 (horizontal PCIe slot 1)
7	RTC battery on motherboard	15	TPM socket (on motherboard, not visible under power supply in this view)
8	PCIe riser 1 (horizontal PCIe slot 7)	16	RAID backup unit (supercap power module) mounting location (two, on air baffle not shown in this view)

## Color-Coded Touch Points

This server has color-coded touch points that indicate thumbscrews and latches on replaceable and hot-swappable components.

- Hot-swappable components have green plastic touch points, which include the internal cooling fans and the power supplies. (Exceptions are the drive trays on the front panel, which are hot-swappable but not green).
- Some replaceable but non-hot-swappable components have light-blue plastic touch points, which include PCIe risers, PCIe slots, and the fan tray.

## Installing or Replacing Server Components



**Warning**

---

**Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.**

Statement 1029

---



**Warning**

---

**Class 1 laser product.**

Statement 1008

---



**Caution**

---

When handling server components, wear an ESD strap to avoid damage.

---

This section describes how to install and replace server components, and it includes the following topics:

- [Replacing Hard Drives or Solid State Drives, page 3-12](#)
- [Replacing a Modular Drive Bay Assembly, page 3-14](#)
- [Replacing Fan Modules, page 3-17](#)
- [Replacing a Fan Tray, page 3-19](#)
- [Replacing DIMMs, page 3-21](#)
- [Replacing CPUs and Heatsinks, page 3-27](#)
- [Replacing the Motherboard RTC Battery, page 3-33](#)
- [Replacing a PCIe Riser Assembly, page 3-35](#)
- [Replacing an I/O Riser, page 3-37](#)
- [Replacing an Internal SD Card, page 3-39](#)
- [Replacing a PCIe Card, page 3-40](#)
- [Replacing the Supercap Power Module \(RAID Backup Unit\), page 3-49](#)
- [Installing a Trusted Platform Module, page 3-51](#)
- [Enabling the Intel Trusted Execution Technology Feature For the TPM, page 3-52](#)
- [Replacing Power Supplies, page 3-54](#)
- [Enabling or Disabling the Internal USB Port, page 3-55](#)

## Replacing Hard Drives or Solid State Drives

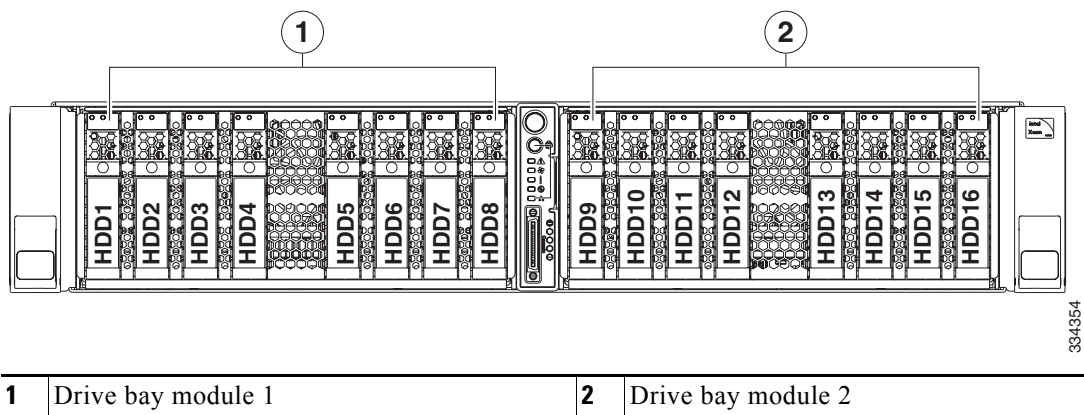
This section includes the following topics:

- [Drive Population Guidelines](#), page 3-12
- [Drive Replacement Procedure](#), page 3-13

### Drive Population Guidelines

The server can operate with one or two drive bay modules. Each drive bay module can hold up to eight 2.5-inch drives for a total of 16 drives. [Figure 3-6](#) shows the drive bay modules and the drive bay numbering.

**Figure 3-6** Drive Bay Modules and Drive Bay Numbering



Observe these drive population guidelines for optimum performance:

- When populating drives in a drive bay module, add drives in empty slots from left to right.
- If your server has two drive bay modules, populate all eight bays in module 1 before you populate the module 2 bays.
- Keep an empty drive blanking tray in any unused slots to ensure proper airflow.
- You can mix hard drives and SSDs in the same server. However, you cannot configure a logical volume (virtual drive) that contains a mix of hard drives and SSDs. When you create a logical volume, it must contain all hard drives or all SSDs.

## Drive Replacement Procedure

To replace or install a hot-pluggable hard drive, follow these steps:

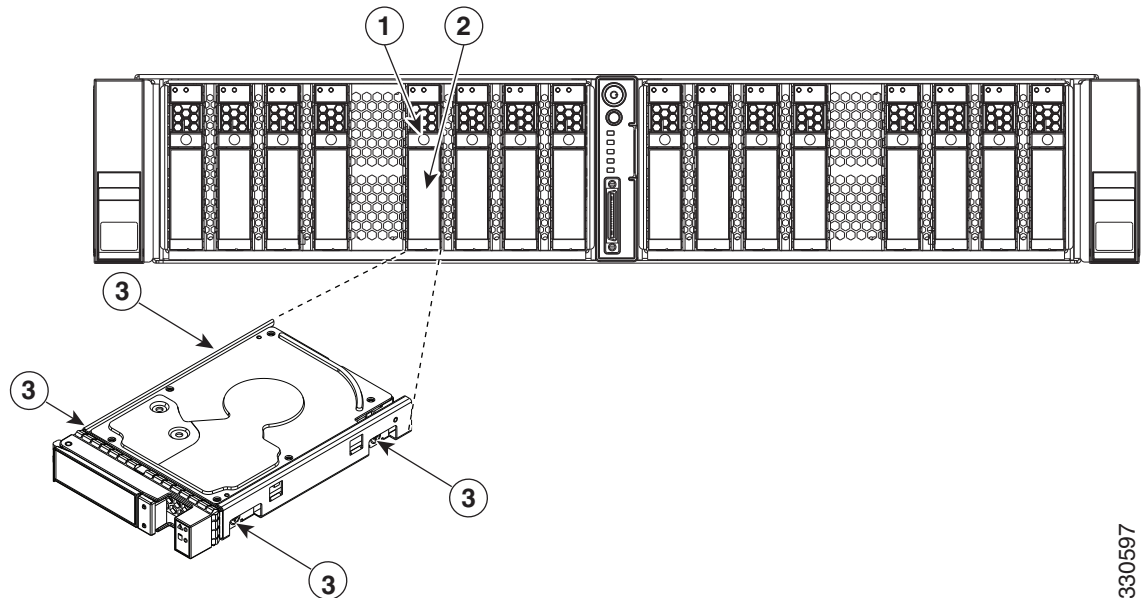


### Tip

You do not have to shut down or power off the server to replace hard drives or solid state drives (SSDs) because they are hot-pluggable.

- Step 1** Remove the drive that you are replacing or remove a blank panel from an empty bay:
- Press the release button on the face of the drive tray. See [Figure 3-7](#).
  - Grasp and open the ejector lever and then pull the drive tray out of the slot.
  - If you are replacing an existing drive, remove the four drive tray screws that secure the drive to the tray and then lift the drive out of the tray.
- Step 2** Install a new drive:
- Place a new drive in the empty drive tray and replace the four drive tray screws.
  - With the ejector lever on the drive tray open, insert the drive tray into the empty drive bay.
  - Push the tray into the slot until it touches the backplane, and then close the ejector lever to lock the drive in place.

**Figure 3-7** Removing and Replacing Hard Drives



1	Release button	3	Drive tray securing screws (4)
2	Ejector lever		

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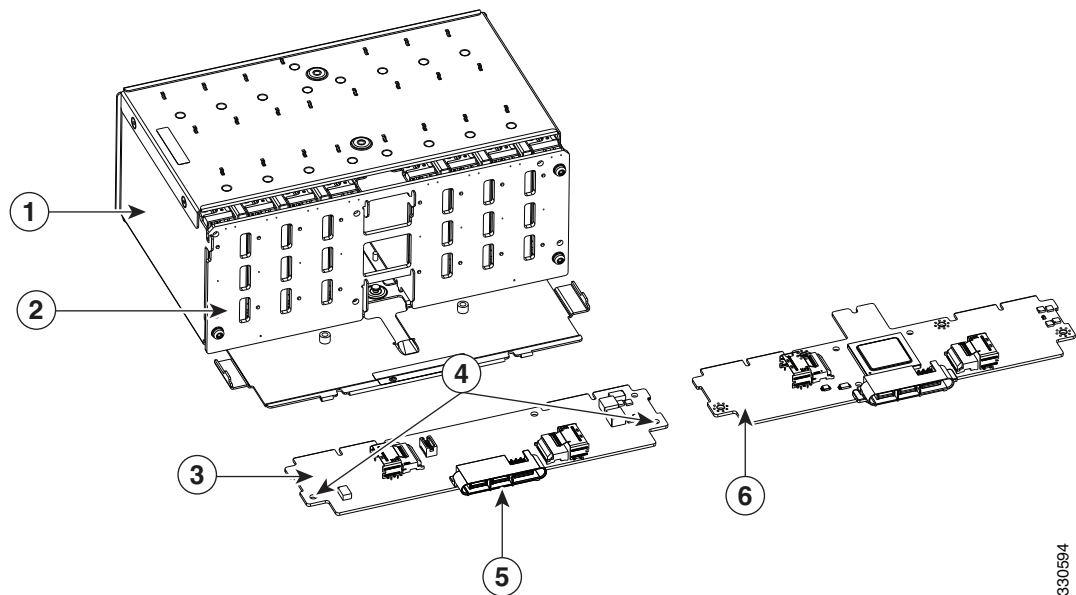
## Replacing a Modular Drive Bay Assembly

The server allows modular configuration of the drive bays, so that you can use one or two drive bays depending on your needs.

Each drive bay assembly includes the chassis-steel drive bay, the attached drive backplane, and a transition card (expander or nonexpander version) that provides a connection to your RAID controllers and the motherboard.

- Each of the two modular chassis drive bays can hold up to eight 2.5-inch drives.
- Each drive backplane connects to one transition card. The transition card connects the drive backplane to the motherboard and connects to cables from your RAID controller.
- The transition card is available in two versions:
  - Nonexpander—Two internal connections to the RAID controller card are required to control eight drives. This version includes two connectors for the cables from your RAID controller. One connector allows control of drives 1 through 4 on the backplane. The other connector allows control of drives 5 through 8 on the backplane.
  - Expander—One internal connection to the RAID controller card is required to control eight drives. This one connector allows control of drives 1 through 8 on the backplane.
- To use more than eight 2.5-inch drives in the server (up to 16), two drive bay modules are required, each with its own backplane and transition card.

**Figure 3-8** Drive Bay Assembly and Transition Card (Two Versions)



1	Chassis drive bay module (rear view)	4	Transition card securing screws (two)
2	Drive backplane	5	Transition card connector to motherboard
3	Transition card (nonexpander version)	6	Transition card (expander version)

330594



To install or replace the modular drive bay assembly, follow these steps:

- Step 1** Remove the assembly that you are replacing. See [Figure 3-8](#) and [Figure 3-9](#):
- Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
  - Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution**

If you cannot safely view and access the component, remove the server from the rack.

- Remove the top cover as described in [Removing and Replacing the Server Top Cover, page 3-9](#).
- Remove all drives from the drive-bay module that you are replacing.
- Remove the fan tray from the chassis, as described in [Replacing a Fan Tray, page 3-19](#). You do not have to remove the fan modules from the fan tray.
- Disconnect RAID controller cables from the transition card that you are replacing.

**Tip**

Label the cables before you disconnect them to aid replacement.

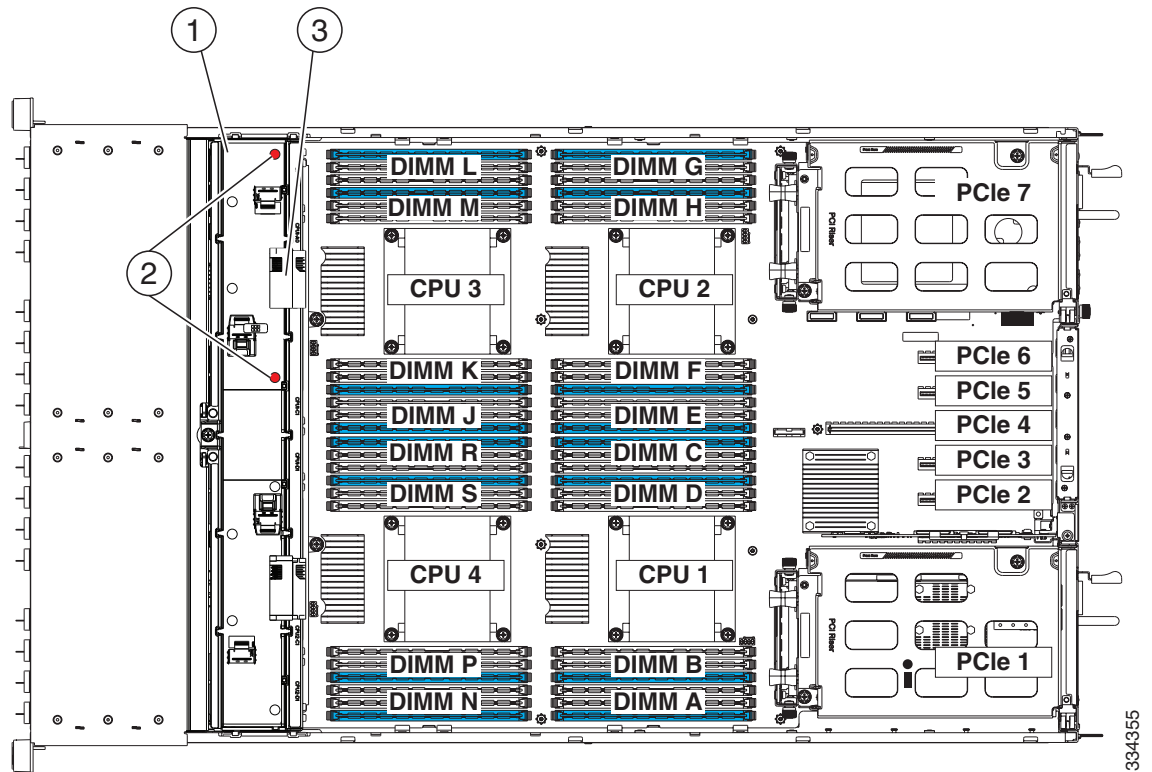
- Use a Number 2 Phillips screwdriver to remove the two screws that secure the transition card to the chassis floor (see [Figure 3-9](#)).
- Slide the drive bay with the attached backplane and transition card out the front of the chassis. The transition card disengages from its motherboard connector.

**Note**

Tilt the module downward as you slide it out the chassis opening to provide clearance over an alignment peg on the chassis floor.

- Step 2** Install a new drive bay assembly:
- Carefully slide the drive bay with the attached backplane and transition card into the front chassis opening.  
Stop when the connector on the rear edge of the transition card is fully engaged with the motherboard connector and the front of the drive bay is even with the chassis front panel.
  - Replace the two screws that secure the transition card to the chassis floor.
  - Replace the RAID controller cables to the connectors on the transition card.
  - Replace the fan tray as described in [Replacing a Fan Tray, page 3-19](#).
  - Replace the top cover.
  - Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-9 Removing and Replacing the Drive-Bay Module



334355

1	Transition card on chassis floor (shown with fan tray removed)	3	Transition card connector to motherboard
2	Transition card securing screws (2)		

## Replacing Fan Modules

The six fan modules in the server are numbered as shown in [Figure 3-10](#) when you are facing the front of the server.

**Figure 3-10 Fan Module Numbering**

FAN 1	FAN 2	FAN 3	FAN 4	FAN 5	FAN 6
Front of Server					



**Tip**

Each fan module has a fault LED that lights amber if the fan module fails.

To replace or install a hot-pluggable fan module, follow these steps:



**Caution**

You do not have to shut down or power off the server to replace fan modules because they are hot-pluggable. However, to maintain proper cooling, do not operate the server for more than one minute with any fan module removed.

**Step 1**

Remove the fan module that you are replacing (see [Figure 3-11](#)):

- a. Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.



**Caution**

If you cannot safely view and access the component, remove the server from the rack.

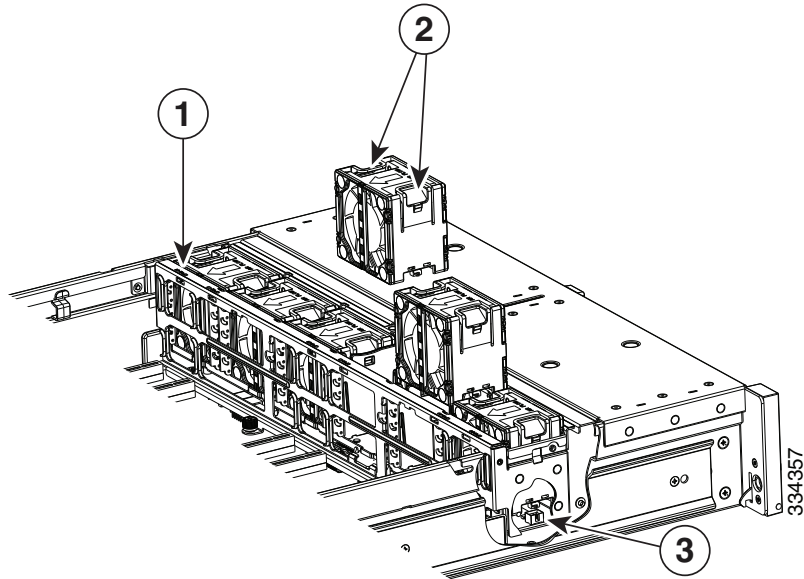
- b. Remove the top cover as described in [Removing and Replacing the Server Top Cover, page 3-9](#).
- c. Insert your thumb and forefinger into the two green release latches on the top of the fan module.
- d. Squeeze the release latches together and lift out the fan module.

**Step 2**

Install a new fan module:

- a. Grasp the fan module by the release latches and align it with the empty fan bay and the connector on the floor of the fan tray. See [Figure 3-11](#).
- b. Press down on the top corners of the fan module until the connector is fully seated and the release latches lock in place.
- c. Replace the top cover.
- d. Replace the server in the rack.

**Figure 3-11** Removing and Replacing Fan Modules



1	Fan tray	3	Connector location on underside of fan module
2	Fan module release latches		

## Replacing a Fan Tray

To replace a fan tray, follow these steps:

- Step 1** Remove the fan tray (see [Figure 3-12](#)):
- Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
  - Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

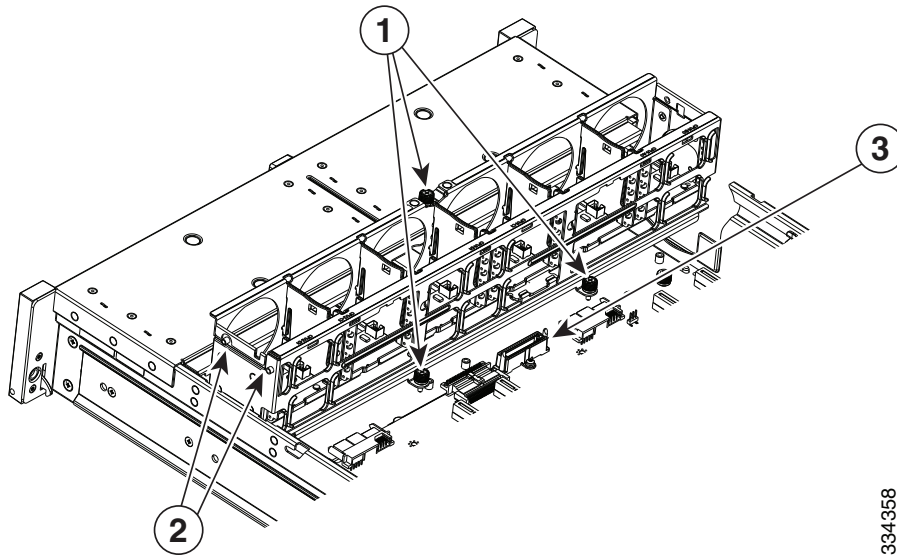


**Caution**

If you cannot safely view and access the component, remove the server from the rack.

- Remove the top cover as described in [Removing and Replacing the Server Top Cover, page 3-9](#).
  - Use a Number 2 Phillips-head screwdriver to loosen the three captive thumbscrews that secure the fan tray to the chassis.
  - Lift the fan tray straight up and out of the chassis.
- Step 2** Install a new fan tray (see [Figure 3-12](#)):
- Carefully align the new tray with the chassis and lower it in place:
    - Align the connector on the underside of the tray with its socket on the motherboard.
    - Align the two guide pegs on each end of the tray with the slots in the chassis.
  - Tighten the three captive thumbscrews that secure the tray to the motherboard and chassis.
  - Replace the top cover.
  - Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

**Figure 3-12** Removing and Replacing a Fan Tray



334358

<b>1</b>	Captive thumbscrews (3)	<b>3</b>	Motherboard connector location
<b>2</b>	Guide pegs (2 on each end of fan tray)		

## Replacing DIMMs

This section includes the following topics:

- [DIMM Performance Guidelines and Population Rules, page 3-21](#)
- [DIMM Replacement Procedure, page 3-26](#)

**Caution**

---

DIMMs and their sockets are fragile and must be handled with care to avoid damage during installation.

---

**Caution**

---

Cisco does not support third-party DIMMs. Using non-Cisco DIMMs in the server might result in system problems or damage to the motherboard.

---

**Note**

---

To ensure the best server performance, it is important that you are familiar with memory performance guidelines and population rules before you install or replace the memory.

---

## DIMM Performance Guidelines and Population Rules

This section describes the type of memory that the server requires and its effect on performance. The section includes the following topics:

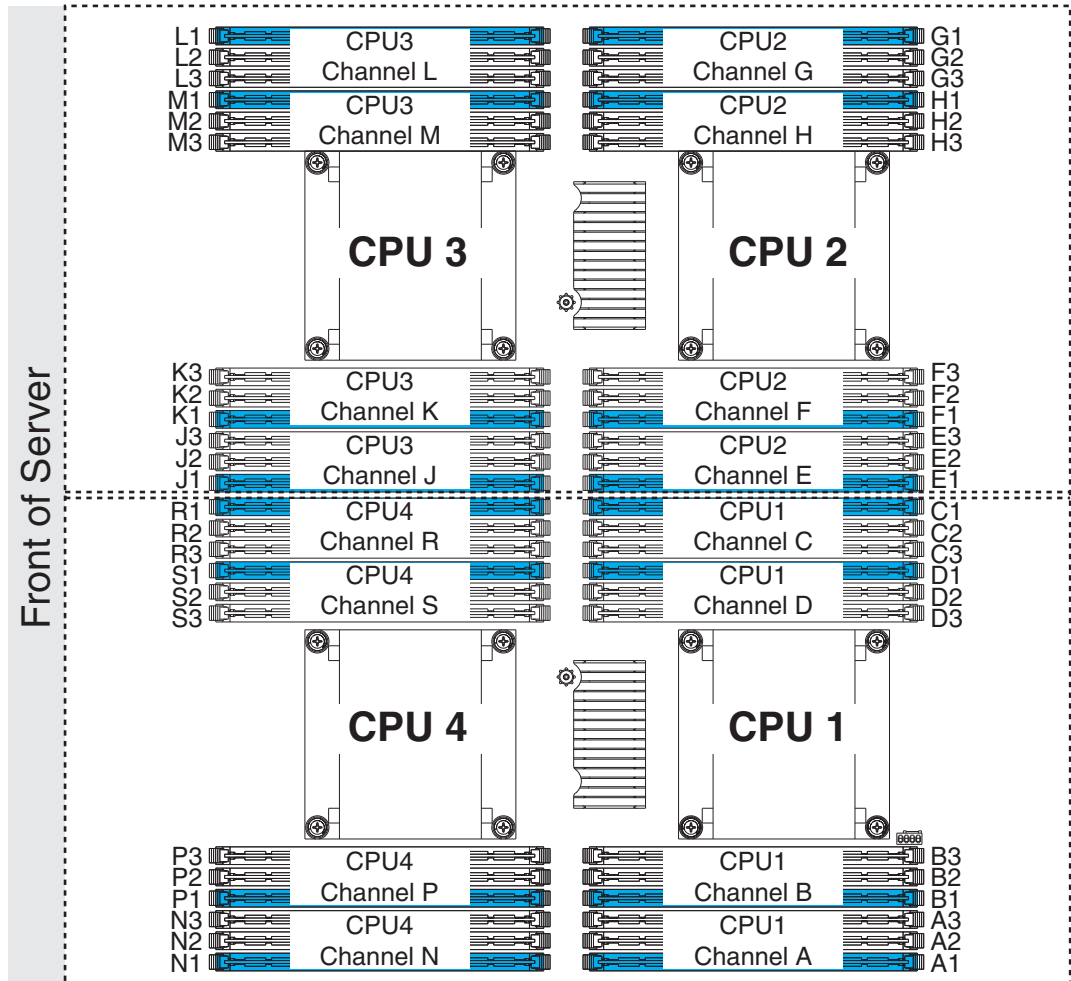
- [DIMM Sockets, page 3-22](#)
- [DIMM Population Rules, page 3-23](#)
- [Memory Mirroring Mode, page 3-25](#)
- [Lockstep Channel Mode, page 3-25](#)

## DIMM Sockets

Figure 3-13 shows the DIMM sockets on the motherboard.

- Each CPU supports four DDR3 memory channels.
- Channels are labeled with letters as shown in Figure 3-13.
- Each channel has three DIMM sockets. The blue socket in a channel is always socket 1.

Figure 3-13 DIMM and CPU Sockets on the Motherboard





## DIMM Population Rules

Observe the following guidelines when installing or replacing DIMMs (see [Figure 3-13](#)):

- The minimum configuration is one DIMM installed in any of CPU1's blue sockets (A1, B1, C1, D1).
- When populating a channel, fill the blue socket first, and then fill the black sockets (1, 2, 3).
- The server supports one, two, or three DIMMs per channel for single- or dual-rank DIMMs.
- The server supports only one or two quad-rank registered DIMMs (RDIMMs) per channel. The server supports one, two, or three quad-rank load-reduced DIMMs (LRDIMMs) per channel.
- The server supports RDIMMs or LRDIMMs. Do not mix RDIMMs and LRDIMMs in a server.
- Unregistered DIMMs (UDIMMs) and non-ECC DIMMs are not supported.
- For memory mirroring population rules, see [Memory Mirroring Mode, page 3-25](#).
- There is no requirement to install DIMMs evenly across all CPUs. However, for optimal performance, you should populate sockets in the order that is shown in [Table 3-4](#) for two-CPU systems or [Table 3-5](#) for four-CPU systems.

**Table 3-4** DIMM Population for Two-CPU System Optimum Performance

# of DIMMs Installed	CPU	DIMM Socket	Color
<b>First:</b> 1	CPU1	C1	Blue
2	CPU2	E1	Blue
3	CPU1	D1	Blue
4	CPU2	F1	Blue
5	CPU1	B1	Blue
6	CPU2	H1	Blue
7	CPU1	A1	Blue
8	CPU2	G1	Blue
9	CPU1	C2	Black
10	CPU2	E2	Black
11	CPU1	D2	Black
12	CPU2	F2	Black
13	CPU1	B2	Black
14	CPU2	H2	Black
15	CPU1	A2	Black
16	CPU2	G2	Black
17	CPU1	C3	Black
18	CPU2	E3	Black
19	CPU1	D3	Black
20	CPU2	F3	Black
21	CPU1	B3	Black
22	CPU2	H3	Black
23	CPU1	A3	Black
<b>Last:</b> 24	CPU2	G3	Black

**Table 3-5** DIMM Population For 4-CPU System Optimum Performance

# of DIMMs Installed	CPU	DIMM Socket	Color	# of DIMMs Installed	CPU	DIMM Socket	Color
<b>First: 1</b>	CPU1	C1	Blue	25	CPU1	B2	Black
2	CPU2	E1	Blue	26	CPU2	H2	Black
3	CPU3	J1	Blue	27	CPU3	M2	Black
4	CPU4	R1	Blue	28	CPU4	P2	Black
5	CPU1	D1	Blue	29	CPU1	A2	Black
6	CPU2	F1	Blue	30	CPU2	G2	Black
7	CPU3	K1	Blue	31	CPU3	L2	Black
8	CPU4	S1	Blue	32	CPU4	N2	Black
9	CPU1	B1	Blue	33	CPU1	C3	Black
10	CPU2	H1	Blue	34	CPU2	E3	Black
11	CPU3	M1	Blue	35	CPU3	J3	Black
12	CPU4	P1	Blue	36	CPU4	R3	Black
13	CPU1	A1	Blue	37	CPU1	D3	Black
14	CPU2	G1	Blue	38	CPU2	F3	Black
15	CPU3	L1	Blue	39	CPU3	K3	Black
16	CPU4	N1	Blue	40	CPU4	S3	Black
17	CPU1	C2	Black	41	CPU1	B3	Black
18	CPU2	E2	Black	42	CPU2	H3	Black
19	CPU3	J2	Black	43	CPU3	M3	Black
20	CPU4	R2	Black	44	CPU4	P3	Black
21	CPU1	D2	Black	45	CPU1	A3	Black
22	CPU2	F2	Black	46	CPU2	G3	Black
23	CPU3	K2	Black	47	CPU3	L3	Black
24	CPU4	S2	Black	<b>Last: 48</b>	CPU4	N3	Black

## Memory Mirroring Mode

**Note**

You cannot use memory sparing and memory mirroring at the same time.

When you enable memory mirroring mode, the memory subsystem simultaneously writes identical data to two channels. If a memory read from one of the channels returns incorrect data due to an uncorrectable memory error, the system automatically retrieves the data from the other channel. A transient or soft error in one channel does not affect the mirrored data, and operation continues.

Memory mirroring reduces the amount of memory available to the operating system by 50 percent because only one of the two populated channels provides data.

If you choose to enable memory mirroring, you must install sets of identical DIMMs as follows:

- For a two-CPU system, you must install DIMMs in identical sets of four. Use each set of four identical DIMMs to populate the sockets in the order shown in [Table 3-4](#).
- For a four-CPU system, you must install DIMMs in identical sets of eight. Use each set of eight identical DIMMs to populate the DIMM sockets in the order shown in [Table 3-5](#).

## Lockstep Channel Mode

When you enable lockstep channel mode, each memory access is a 128-bit data access that spans four channels.

Lockstep channel mode requires that all four memory channels on a CPU must be populated identically with regards to size and organization. DIMM socket populations within a channel do not have to be identical but the same DIMM slot location across all four channels must be populated the same.

For example, DIMMs in sockets A1, B1, C1, and D1 must be identical. DIMMs in sockets A2, B2, C2, and D2 must be identical. However, the A1-B1-C1-D1 DIMMs do not have to be identical with the A2-B2-C2-D2 DIMMs.

If you choose to enable lockstep channel mode, you must install sets of identical DIMMs as follows:

- For a two-CPU system, you must install DIMMs in identical sets of four. Use each set of four identical DIMMs to populate the sockets in the order shown in [Table 3-4](#).
- For a four-CPU system, you must install DIMMs in identical sets of eight. Use each set of eight identical DIMMs to populate the DIMM sockets in the order shown in [Table 3-5](#).

## DIMM Replacement Procedure

This section includes the following topics:

- [Identifying a Faulty DIMM, page 3-26](#)
- [Replacing DIMMs, page 3-26](#)

### Identifying a Faulty DIMM

Each DIMM socket on the motherboard has a corresponding DIMM fault LED. See [Internal Diagnostic LEDs, page 3-7](#) for the locations of the LEDs and how to activate them.

### Replacing DIMMs

To install a DIMM assembly, follow these steps:

- 
- Step 1** Remove the DIMMs that you are replacing:
- Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
  - Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.



**Caution**

If you cannot safely view and access the component, remove the server from the rack.

- Remove the top cover as described in “[Removing and Replacing the Server Top Cover](#)” section on [page 3-9](#).
- Remove the internal air baffle that covers the DIMM sockets.
- Locate the faulty DIMM and remove it from the socket on the motherboard by opening the ejector levers at both ends of the DIMM socket.

- Step 2** Install a new DIMM:



**Note** Before installing risers or DIMMs, refer to the population guidelines. See [DIMM Performance Guidelines and Population Rules, page 3-21](#).

- Align the new DIMM with the socket on the motherboard. Use the alignment key in the DIMM socket to correctly orient the DIMM.
  - Push the DIMM into the connector until it is fully seated and the ejector levers on either side of the connector lock into place.
  - Replace the internal air baffle, and then replace the top cover.
  - Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.
-

## Replacing CPUs and Heatsinks

The server supports up to four EP-Series CPUs. See [Figure 3-13 on page 3-22](#) for the CPU socket numbering.

- The minimum configuration is two CPUs (CPU1 and CPU2).
- The server must have either two or four CPUs to operate; you should populate CPU1 and CPU2 first, and then populate CPU3 and CPU4.

This section contains the following topics:

- [Additional CPU-Related Parts To Order With RMA Replacement Motherboards, page 3-27](#)
- [CPU Replacement Procedure, page 3-28](#)

### Additional CPU-Related Parts To Order With RMA Replacement Motherboards

When a return material authorization (RMA) of the motherboard or CPU is done on a Cisco UCS C-series server, there are additional parts that might not be included with the CPU or motherboard spare bill of materials (BOM). The TAC engineer might need to add the additional parts to the RMA to help ensure a successful replacement.

- Scenario 1—You are re-using the existing heatsinks:
  - Heat sink cleaning kit (UCSX-HSCK=)
  - Thermal grease kit for C420 (UCS-CPU-GREASE=)
  - Intel CPU Pick-n-Place tool for EP CPUs (UCS-CPU-EP-PNP=)
- Scenario 2—You are replacing the existing heatsinks:
  - Heat sink (UCSC-HS-C420M3=)
  - Heat sink cleaning kit (UCSX-HSCK=)
  - Intel CPU Pick-n-Place tool for EP CPUs (UCS-CPU-EP-PNP=)

A CPU heatsink cleaning kit is good for up to four CPU and heatsink cleanings. The cleaning kit contains two bottles of solution, one to clean the CPU and heatsink of old thermal interface material and the other to prepare the surface of the heatsink.

New heatsink spares have preinstalled thermal interface material covered by a small sheet of plastic. It is important to clean the old thermal interface material off of the CPU prior to installing the heatsinks. Therefore, when ordering new heatsinks it is still necessary to order the heatsink cleaning kit at a minimum.

## CPU Replacement Procedure


**Caution**

CPUs and their motherboard sockets are fragile and must be handled with care to avoid damaging pins during installation. The CPUs must be installed with heatsinks and their thermal pads to ensure proper cooling. Failure to install a CPU correctly might result in damage to the server.


**Caution**

The Pick-and-Place tools used in this procedure are required to prevent damage to the contact pins between the motherboard and the CPU. Do not attempt this procedure without the required tools, which are included with each CPU option kit. If you do not have the tool, you can order a spare (Cisco PID UCS-CPU-EP-PNP).

To install or replace a CPU heatsink and CPU, follow these steps:

**Step 1**

Prepare the server for replacement:

- a. Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
- b. Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.


**Caution**

If you cannot safely view and access the component, remove the server from the rack.

- c. Remove the top cover as described in [Removing and Replacing the Server Top Cover, page 3-9](#).
- d. Remove the internal air baffle that covers the CPU sockets.



**Step 2**

Use a Number 2 Phillips-head screwdriver to loosen the four captive screws that secure the heatsink and lift it off of the CPU.



**Note** Loosen each screw evenly to avoid damaging the heatsink or CPU.

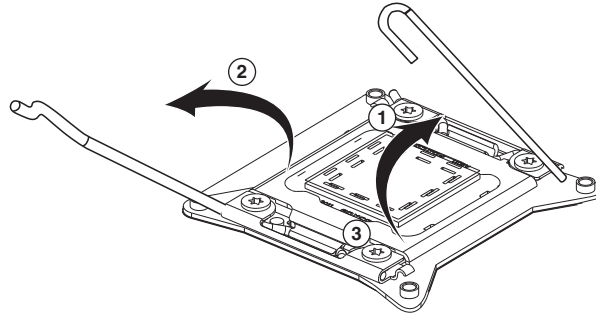
**Step 3**

Unclip the first CPU retaining latch that is labeled with the  icon, and then unclip the second retaining latch that is labeled with the  icon. See [Figure 3-14](#).



**Step 4**

Open the hinged CPU cover plate. See [Figure 3-14](#).

**Figure 3-14 CPU Retaining Latches**



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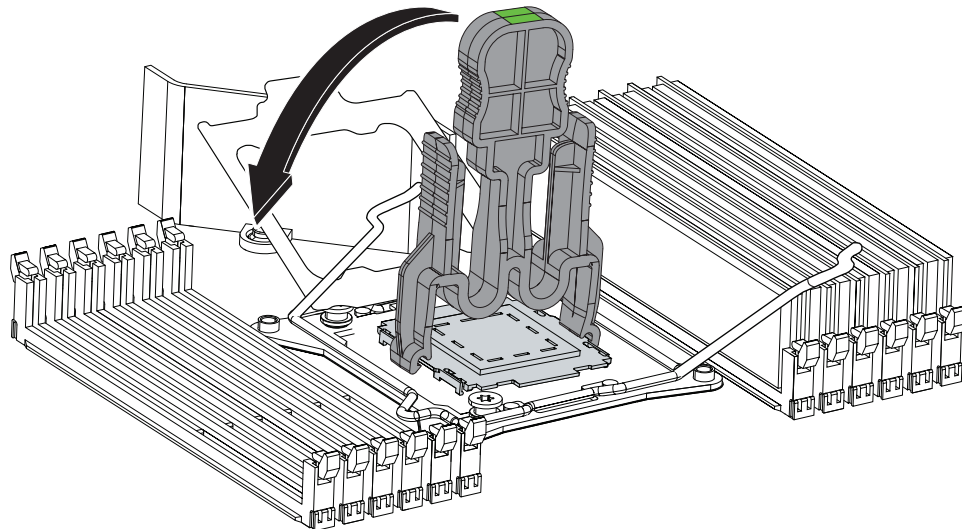
<b>1</b>	CPU retaining latch, 	<b>3</b>	Hinged CPU cover plate
<b>2</b>	CPU retaining latch, 		

**Step 5** Remove a protective cap from the socket (if present).

If you are installing a new CPU to a socket that was shipped empty, the socket has a protective cap that is intended to prevent bent contact pins. If you are removing an old CPU instead, skip to [Step 6](#).

Use the tool as shown in [Figure 3-15](#) to grasp the protective cap and then pivot to remove the cap.

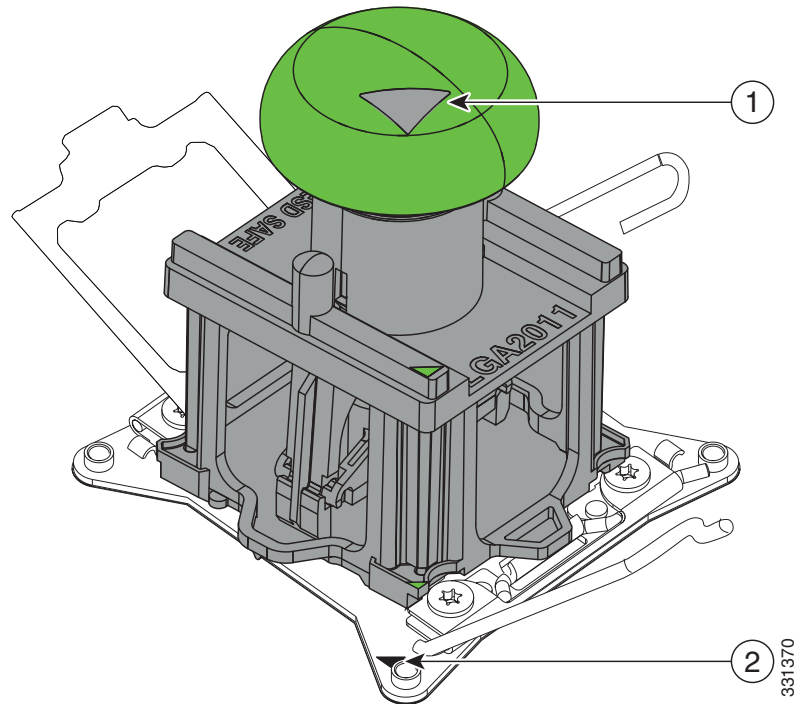
**Figure 3-15 Protective Cap Removal Tool**



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- Step 6** Remove the old CPU:
- a. Set the Pick-and-Place tool on the CPU in the socket, aligning the arrow on the tool with the registration mark on the socket (the small triangular mark). See [Figure 3-16](#).
  - b. Press the top button on the tool to grasp the installed CPU.
  - c. Lift the tool and CPU straight up.
  - d. Press the top button on the tool to release the old CPU on an antistatic surface.

**Figure 3-16** Removing or Inserting a CPU

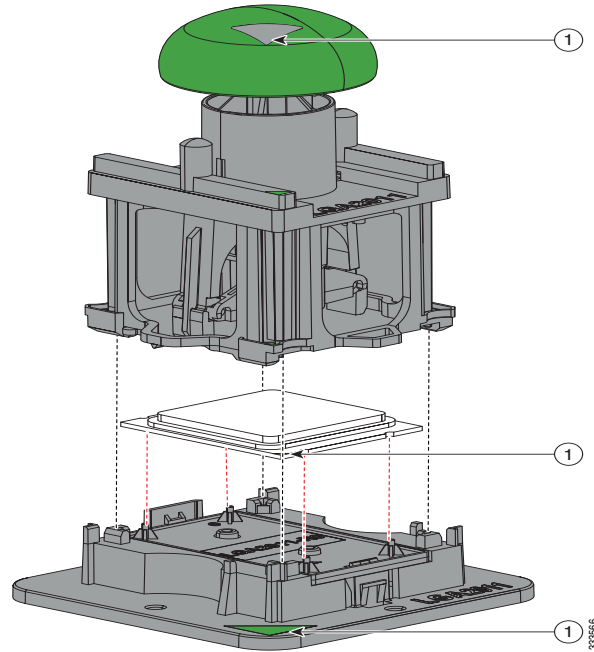


<b>1</b>	Arrow on tool	<b>2</b>	Registration mark on CPU socket
----------	---------------	----------	---------------------------------

- Step 7** Insert the new CPU into the Pick-and-Place tool:
- a. Remove the new CPU from the packaging and place it on the pedestal that is included in the kit. Align the registration mark on the corner of the CPU with the arrow on the corner of the pedestal (see [Figure 3-17](#)).
  - b. Press down on the top button of the tool to lock it open.
  - c. Set the Pick-and-Place tool on the CPU pedestal, aligning the arrow on the tool with the arrow on the corner of the pedestal. Make sure that the tabs on the tool are fully seated in the slots on the pedestal.
  - d. Press the side lever on the tool to grasp and lock in the CPU.
  - e. Lift the tool and CPU straight up off the pedestal.



Figure 3-17 CPU and Pick-and-Place Tool on Pedestal





<b>1</b>	Arrow marks for alignment
----------	---------------------------

**Step 8** Install a new CPU:

- a. Set the Pick-and-Place tool that is holding the CPU over the empty CPU socket on the motherboard.



**Note** Align the arrow on the top of the tool with the registration mark (small triangle) that is stamped on the metal of the CPU socket, as shown in [Figure 3-16 on page 3-30](#).

- b. Press the top button on the tool to set the CPU into the socket. Remove the empty tool.
- c. Close the hinged CPU cover plate.
- d. Clip down the CPU retaining latch with the  icon, then clip down the CPU retaining latch with the  icon. See [Figure 3-14 on page 3-29](#).

**Step 9** Install a heatsink:



**Caution**

The heatsink must have a new, undamaged thermal pad on the heatsink-to-CPU surface to ensure proper cooling. If you are reusing a heatsink, you must remove the old thermal pad. If you are installing a new heatsink, skip to Step [d.](#) below.

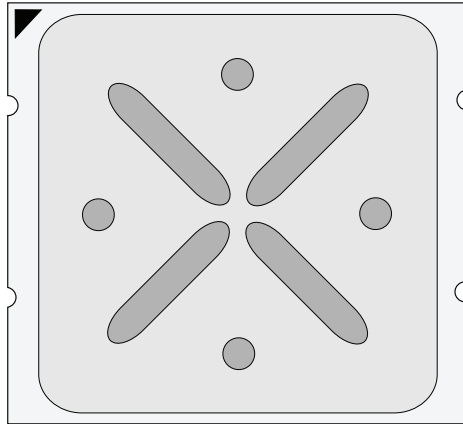
- a. Apply an alcohol-based cleaning solution to the old thermal pad and let it soak for a least 15 seconds.
- b. Wipe all of the old thermal pad off the old heatsink using a soft cloth that will not scratch the heatsink surface.
- c. Apply thermal grease from an included syringe to the top of the CPU.

Apply about 2 cubic centimeters of grease (about half the syringe contents) to the top of the CPU in the pattern that is shown in [Figure 3-18](#).



**Note** If you do not have a syringe of thermal grease, you can order a spare (Cisco PID UCS-CPU-GREASE).

**Figure 3-18 Thermal Grease Application Pattern**



- d. For a new heatsink, peel the protective film from the thermal pad that is on the bottom of the new heatsink.



**Note** Do not apply a syringe of thermal grease if you are installing a new heatsink that already has a preapplied thermal pad.

- e. Align the heatsink captive screws with the motherboard standoffs, and then use a Number 2 Phillips-head screwdriver to tighten the captive screws evenly.



**Note** Tighten each screw evenly to avoid damaging the heatsink or CPU.

- f. Replace the internal air baffle and then the top cover.
- g. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

## Replacing the Motherboard RTC Battery

**Warning**

**There is danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.** [Statement 1015]

The CMOS real-time clock (RTC) battery retains system settings when the server is disconnected from power. The battery type is Panasonic CR2032 or equivalent.

To replace or install the motherboard CMOS battery, follow these steps:

**Step 1**

Remove the RTC battery (see [Figure 3-19](#)):

- a. Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
- b. Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution**

If you cannot safely view and access the component, remove the server from the rack.

- c. Remove the top cover as described in [Removing and Replacing the Server Top Cover, page 3-9](#).
- d. Locate the RTC battery. See [Figure 3-19](#).
- e. Bend the battery retaining clip away from the battery and use a pair of needle-nose pliers to pull the battery from the socket.

**Step 2**

Install the RTC battery:

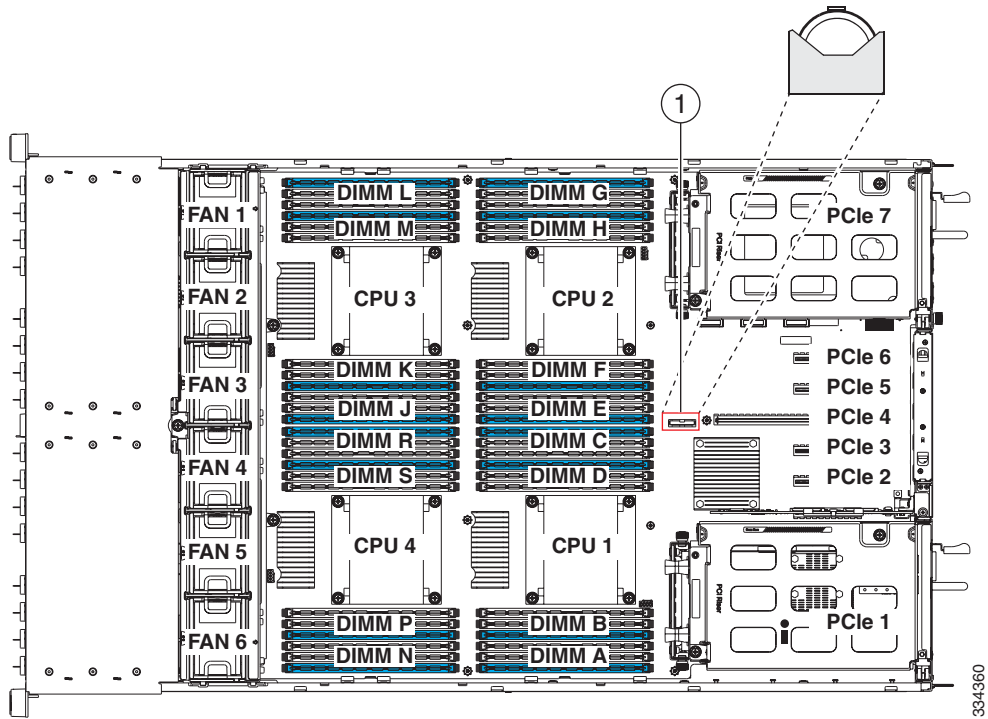
- a. Bend the retaining clip away from the battery socket and insert the battery in the socket.



**Note** The flat, positive side of the battery marked “+” should face the retaining clip.

- b. Push the battery into the socket until it is fully seated and the retaining clip clicks over the top of the battery.
- c. Replace the top cover.
- d. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-19 Removing and Replacing the Motherboard RTC Battery



<p><b>1</b> RTC battery socket on motherboard</p>	<p><b>2</b> Retaining clip (enlarged view)</p> <p>The flat, positive (+) side of the battery faces the clip.</p>
---	--

## Replacing a PCIe Riser Assembly

The server contains two PCIe risers for horizontal installation of PCIe cards. These risers wrap around the power supply bays and connect to dedicated PCIe slots 1 and 7 on the motherboard. These risers each provide one standard-profile, half-length, x16 horizontal slot.

To install or replace a PCIe riser assembly, follow these steps:

- 
- Step 1** Remove the PCIe riser assembly that you are replacing (see [Figure 3-20](#)):
- a. Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
  - b. Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.



**Caution**

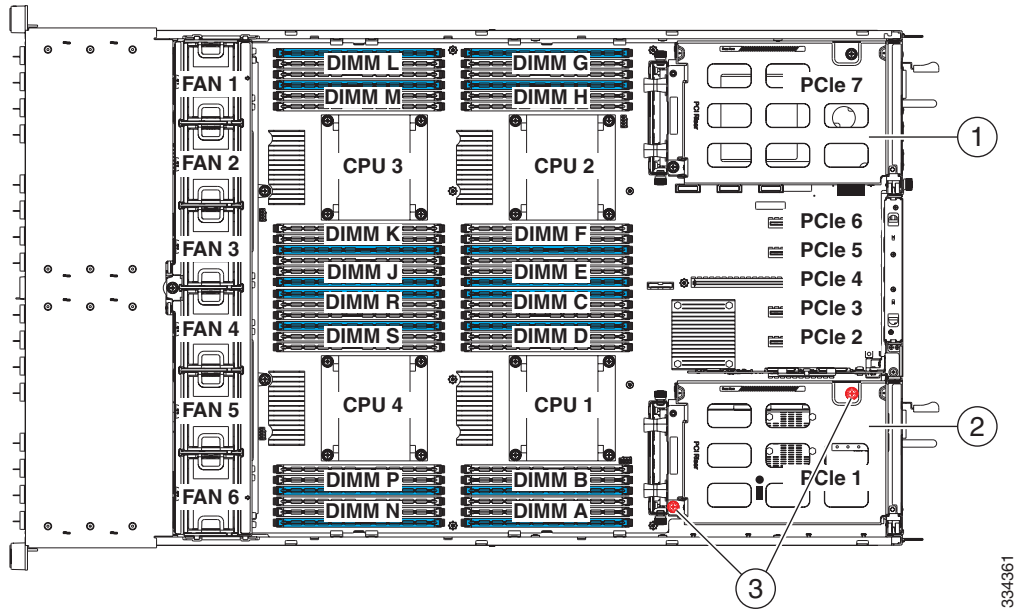
---

If you cannot safely view and access the component, remove the server from the rack.

---

- c. Remove the top cover as described in [Removing and Replacing the Server Top Cover, page 3-9](#).
  - d. Use a Number 2 Phillips-head screwdriver to loosen the two captive thumbscrews that secure the PCIe riser assembly.
  - e. Lift straight up on both ends of the PCIe riser assembly to disengage its circuit board from the socket on the motherboard.
- Step 2** Install a new PCIe riser assembly:
- a. Set the PCIe riser assembly back in place over the power supply bay.
  - b. Align the circuit board edge with the socket on the motherboard and then push straight down on both ends of the assembly to fully engage the board with the socket.
  - c. Tighten the two captive thumbscrews that secure the riser assembly in place.
  - d. Replace the top cover.
  - e. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-20 Removing and Replacing the PCIe Riser Assembly



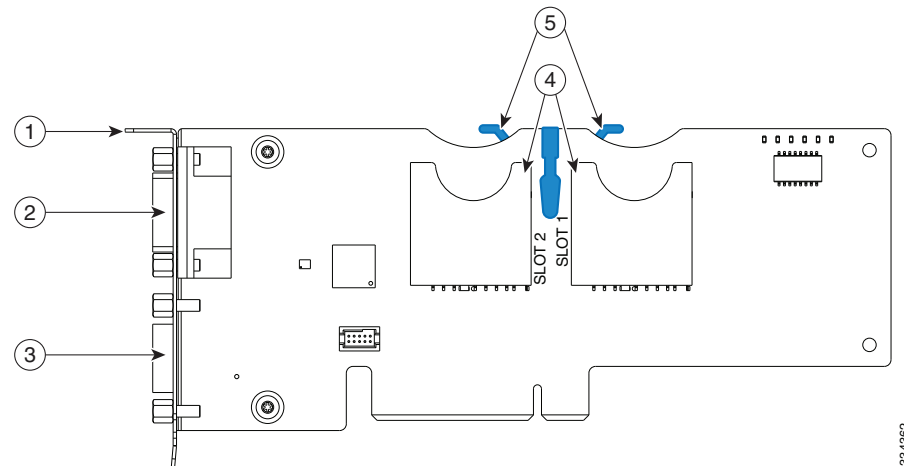
<b>1</b>	PCIe riser 1 (PCIe slot 7)	<b>3</b>	PCI riser captive thumbscrews (two)
<b>2</b>	PCIe riser 2 (PCIe slot 1)		

## Replacing an I/O Riser

The I/O riser is a modular PCIe form-factor card that has a designated motherboard socket inside the server (see [Figure 3-22](#)). The module provides the external VGA video and RS-232 serial connectors for the rear panel of the server. See [Figure 3-21](#).

The I/O riser also provides two internal slots for SD cards.

**Figure 3-21** I/O Riser, Including SD Card Slots



<b>1</b>	I/O riser rear panel tab	<b>4</b>	Internal SD card slots
<b>2</b>	RS-232 serial connector (9-pin)	<b>5</b>	Cisco SD card retainer
<b>3</b>	VGA video connector (15-pin)		

To install or replace an I/O riser, follow these steps:

- Step 1** Remove the I/O riser that you are replacing (see [Figure 3-22](#)):
- Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
  - Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.



**Caution**

If you cannot safely view and access the component, remove the server from the rack.

- Remove the top cover as described in [Removing and Replacing the Server Top Cover, page 3-9](#).
- Disconnect any external cables from the I/O riser ports.
- Use a Number 1 Phillips-head screwdriver to remove the single screw that secures the I/O riser rear-panel tab to the chassis.
- Lift the I/O riser straight up from the motherboard connector.



**Note**

Lift up on both ends of the I/O riser evenly to avoid damaging its connector.

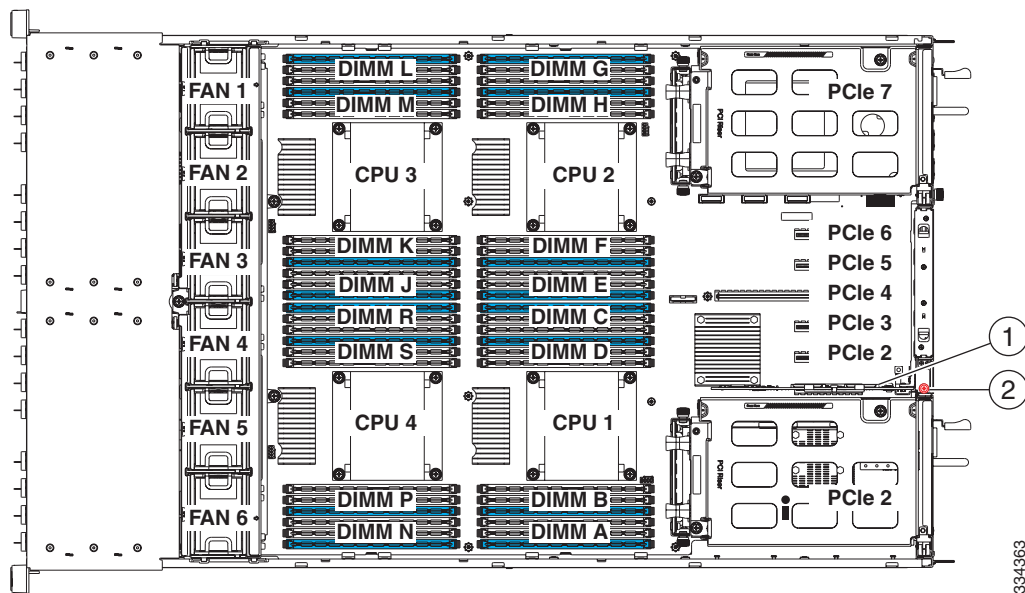
- Step 2** Install a new I/O riser:
- Align the new I/O riser with its designated socket on the motherboard. See [Figure 3-22](#).



**Note** You must install the I/O riser in its designated motherboard socket.

- Push down evenly on both ends of the I/O riser until it is fully seated in its motherboard socket.
- Ensure that the I/O riser rear panel tab sits flat against the chassis rear panel opening.
- Install the single screw that secures the I/O riser to the chassis.
- Replace the top cover.
- Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

**Figure 3-22** Removing and Replacing an I/O Riser



- |          |  |          |                          |
|----------|--|----------|--------------------------|
| <b>1</b> | I/O riser in designated motherboard socket | <b>2</b> | I/O riser securing screw |
|----------|--|----------|--------------------------|



## Replacing an Internal SD Card

To install or replace an internal SD card, follow these steps:

- 
- Step 1** Remove the SD card that you are replacing (see [Figure 3-22](#)):
- Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
  - Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.



**Caution**

---

If you cannot safely view and access the component, remove the server from the rack.

---

- Remove the top cover as described in [Removing and Replacing the Server Top Cover, page 3-9](#).
  - Locate the SD card that you are replacing on the I/O riser card. See [Figure 3-22](#).
  - Pull back the card retainer slightly (see [Figure 3-21](#)), and then push down on the top of the SD card and release it to allow it to spring up in the socket.
  - Remove the SD card from the socket.
- Step 2** Install an internal SD card:
- Pull the card retainer back lightly, then insert the SD card into SD card slot 1 on the I/O riser with the label side facing outward.
  - Press down on the top of the card until it clicks in the slot and stays in place.
  - Replace the top cover.
  - Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.
-

## Replacing a PCIe Card



### Caution

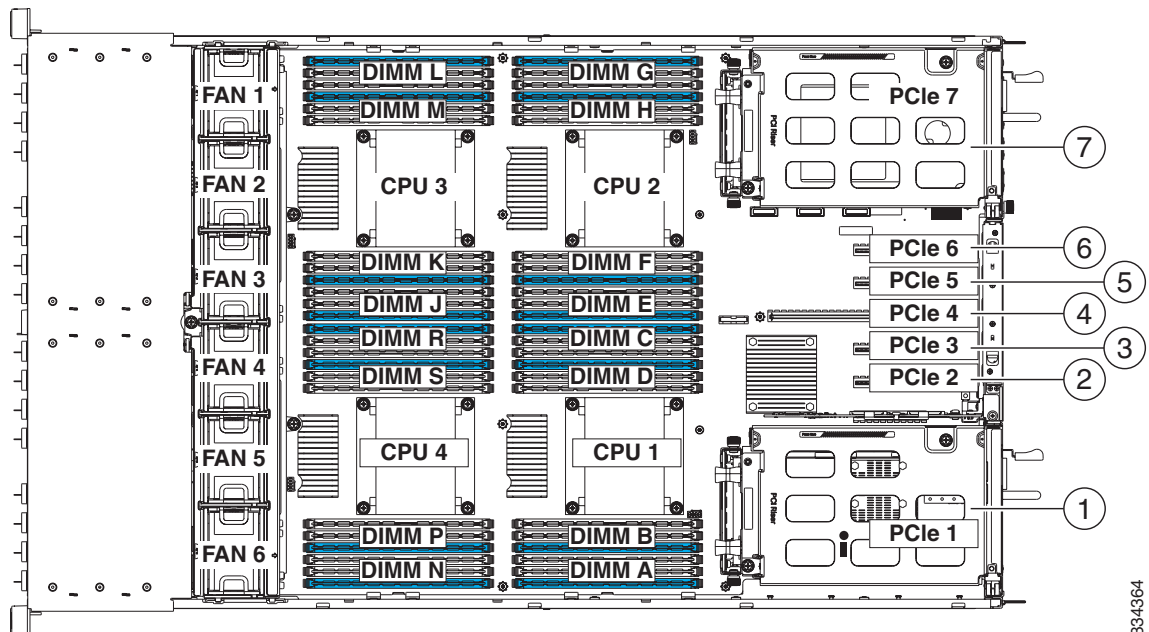
Cisco supports all PCIe cards qualified and sold by Cisco. PCIe cards that are not qualified or sold by Cisco are the responsibility of the customer. Although Cisco always stands behind and supports the C-Series rack-mount servers, customers using standard, off-the-shelf, third-party cards must go to the third-party card vendor for support if any issue with that particular third-party card occurs.

This server has seven PCIe expansion slots. See [Figure 3-23](#) and [Table 3-6](#) for information about the slots. The replacement procedures differ depending on whether the PCIe slot is in a riser or on the motherboard. This section includes the following topics:

- [PCIe Slots](#), page 3-40
- [PCIe Configuration Guide](#), page 3-41
- [Replacing a PCIe Card in a Riser Slot](#), page 3-41
- [Replacing a PCIe Card in a Motherboard Slot](#), page 3-43
- [Special Considerations for Cisco UCS Virtual Interface Cards](#), page 3-45
- [Installing Multiple PCIe Cards and Resolving Limited Resources](#), page 3-46

## PCIe Slots

**Figure 3-23** PCIe Slot Locations



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**Table 3-6** PCIe Expansion Slots

Slot Number	Electrical Lane Width	Connector Length	Card Length <sup>1</sup>	Card Height <sup>2</sup>	NCSI <sup>3</sup> Support
1 (on riser)	Gen-3 x16	x16 connector	½ length	Full height	Yes
2	Gen-3 x8	x8 connector	½ length	½ height	No
3	Gen-3 x8	x8 connector	½ length	½ height	No
4	Gen-3 x8	x16 connector	½ length	½ height	Yes
5	Gen-3 x8	x8 connector	½ length	½ height	No
6	Gen-3 x8	x8 connector	½ length	½ height	No
7 (on riser)	Gen-3 x16	x16 connector	½ length	Full height	Yes

1. This is the supported length because of internal clearance.
2. This is the size of the rear panel opening.
3. NCSI = Network Communications Services Interface protocol. An NCSI slot is powered even when the server is in standby power mode.

## PCIe Configuration Guide

For the best performance, we recommend that you populate the PCIe slots in the order shown in [Table 3-7](#) for each type of add-on card. For each card type, populate the primary slot first, followed by the secondary slot, and then any alternate slots. See [Figure 3-23](#) for the slot locations.

**Table 3-7** PCIe Slot Population

PCIe Card Type	Primary Slot	Secondary Slot	Alternate Slots
RAID controller	Slot 3	Slot 5	—
Low-profile (half-height) network adapter	Slot 2	Slot 6	Slots 1, 4, 5, or 7 <sup>1</sup>
Cisco UCS Virtual Interface Card	Slot 4	Slot 1 or 7	—

1. To use a half-height card in slots 1 or 7, you must have a full-height rear panel attached to the card.

## Replacing a PCIe Card in a Riser Slot

**Note**

If you are installing a Cisco UCS Virtual Interface Card (VIC), see [Special Considerations for Cisco UCS Virtual Interface Cards](#), page 3-45.

To install or replace a PCIe card in full-height slots 1 or 7 on the PCIe risers, follow these steps:

**Step 1**

Remove a PCIe card (or a blank filler panel) from the PCIe riser assembly:

- a. Shut down and power off the server as described in [Shutting Down and Powering Off the Server](#), page 3-8.
- b. Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution**

If you cannot safely view and access the component, remove the server from the rack.

- c. Remove the top cover as described in [Removing and Replacing the Server Top Cover, page 3-9](#).
- d. Use a Number 2 Phillips-head screwdriver to loosen the two captive thumbscrews that secure the PCIe riser assembly. See [Figure 3-20 on page 3-36](#).
- e. Lift straight up on both ends of the PCIe riser assembly to disengage its attached circuit board from the socket on the motherboard.



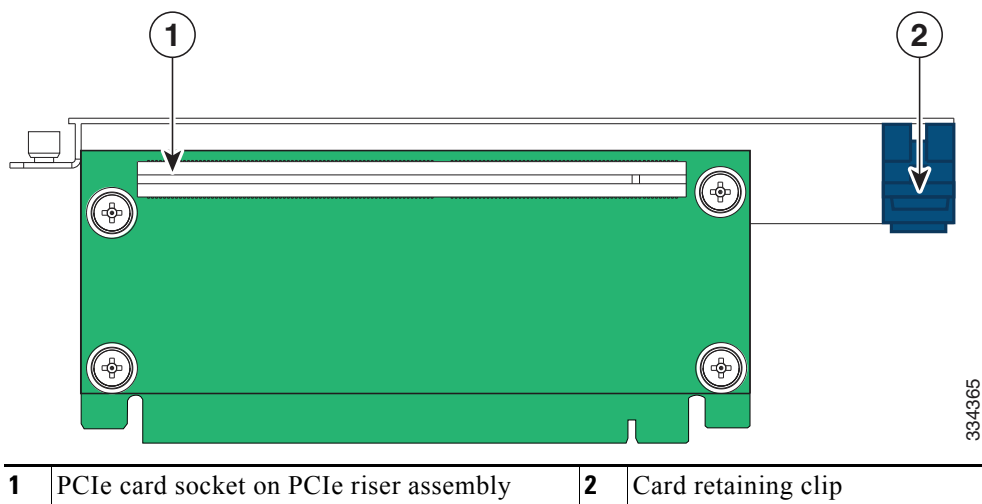
**Note** Lift up on both ends of the PCIe riser evenly to avoid damaging its connector.

- f. Pinch and lift up on the blue-plastic card-retaining clip that secures the card (or filler panel) into the riser.
- g. Pull evenly on both corners of the PCIe card to remove it from the socket on the PCIe riser.

**Step 2** Install a PCIe card:

- a. Align the new PCIe card with the empty socket on the PCIe riser assembly.
- b. Push down evenly on both ends of the card until it is fully seated in the socket.
- c. Ensure that the card's rear-panel tab sits flat against the PCIe riser rear panel opening, and then close the blue-plastic card-retaining clip to secure the card in the riser (see [Figure 3-24](#)).
- d. Set the PCIe riser assembly back in place over the power supply bay.
- e. Align the PCIe riser circuit board edge with the socket on the motherboard and then push straight down on both ends of the PCIe riser assembly to fully engage the board with the socket.
- f. Tighten the two captive thumbscrews that secure the PCIe riser assembly in place.
- g. Replace the top cover.
- h. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

**Figure 3-24** PCIe Riser Assembly Side View



## Replacing a PCIe Card in a Motherboard Slot

**Note**

If you replace an LSI MegaRAID controller card, you must restore your RAID configuration to the new card. See [Restoring RAID Configuration After Replacing a RAID Controller, page C-6](#).

To install or replace a PCIe card in low-profile motherboard slots 2 through 6, follow these steps:

**Step 1**

Remove a PCIe card (or a blank filler panel):

- a. Shut down and power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
- b. Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution**

If you cannot safely view and access the component, remove the server from the rack.

- c. Remove the top cover as described in [Removing and Replacing the Server Top Cover, page 3-9](#).
- d. Open the hinged PCIe card retainer. Pinch the two release latches toward the center of the retainer while you lift up on the front edge of the retainer to open it. See [Figure 3-25](#).
- e. Lift the card straight up from the motherboard connector.

**Note**

Lift up on both ends of the card evenly to avoid damaging its connector.

**Step 2**

Install a PCIe card:

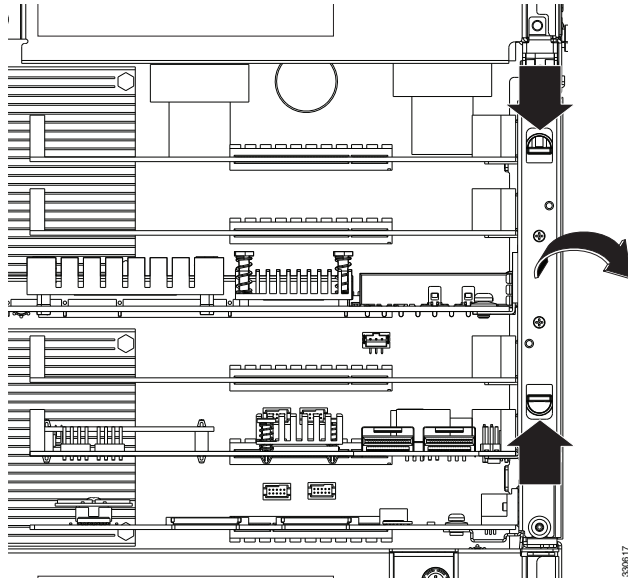
- a. Align the PCIe card with the empty PCIe connector on the motherboard.
- b. Push down evenly on both ends of the card until it is fully seated in the motherboard connector.
- c. Ensure that the card rear panel sits flat against the chassis rear panel opening.
- d. Close the hinged PCIe retainer and push down on it in the closed position until the latches lock in place.
- e. Replace the top cover.
- f. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

**Step 3**

If the card that you replaced is a mass storage controller, restore the RAID configuration on your drives to the new mass storage controller.

See [Restoring RAID Configuration After Replacing a RAID Controller, page C-6](#).

**Figure 3-25** *Hinged PCIe Card Retainer on Rear of Chassis*



## Special Considerations for Cisco UCS Virtual Interface Cards

Table 3-8 describes the requirements for the supported Cisco UCS virtual interface cards (VICs).

**Table 3-8** Cisco UCS C420 Requirements for Virtual Interface Cards

Virtual Interface Card (VIC)	Number of VICs Supported in Server	Slots That Support VICs <sup>1</sup>	Primary Slot For UCS Integration or Cisco Card NIC Mode	Minimum CIMC Firmware	Minimum VIC Firmware for Use With UCS Integration	Minimum Cisco Nexus OS on an Upstream Nexus Fabric Interconnect
Cisco UCS VIC 1225 UCSC-PCIE-CSC-02	3	PCIE 4 PCIE 1 PCIE 7	PCIE 4	1.4(7)	2.1(0)	5.0
Cisco UCS VIC1225T UCSC-PCIE-C10T-02	3	PCIE 4 PCIE 1 PCIE 7	PCIE 4 <sup>2</sup>	1.5(1)	2.1(1)	5.0

1. See [PCIe Slots](#), page 3-40.

2. The Cisco UCS VIC1225T is not supported for UCS integration at this time.

## Installing Multiple PCIe Cards and Resolving Limited Resources

When a large number of PCIe add-on cards are installed in the server, the system might run out of the following resources required for PCIe devices:

- Option ROM memory space
- 16-bit I/O space

The topics in this section provide guidelines for resolving the issues related to these limited resources:

- [Resolving Insufficient Memory Space to Execute Option ROMs, page 3-46](#)
- [Resolving Insufficient 16-Bit I/O Space, page 3-47](#)

### Resolving Insufficient Memory Space to Execute Option ROMs

The system has very limited memory to execute PCIe legacy option ROMs, so when a large number of PCIe add-on cards are installed in the server, the system BIOS might not be able to execute all of the option ROMs. The system BIOS loads and executes the option ROMs in the order that the PCIe cards are enumerated (slot 1, slot 2, slot 3, and so on).

If the system BIOS does not have sufficient memory space to load any PCIe option ROM, it skips loading that option ROM, reports a system event log (SEL) event to the CIMC controller, and reports the following error in the Error Manager page of the BIOS Setup utility:

```
PCI OUT OF RESOURCES CONDITION:
ERROR: Insufficient PCI Resources Detected!!!
```

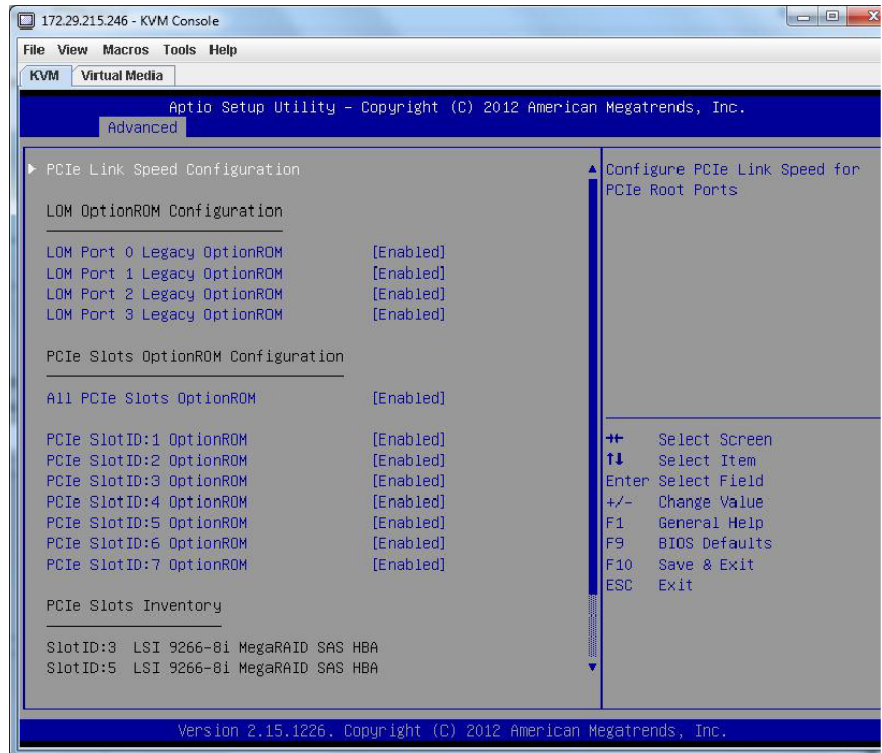
```
System is running with Insufficient PCI Resources!
In order to display this message some
PCI devices were set to disabled state!
It is strongly recommended to power off the system
and remove some PCI/PCI Express cards from the system!
To continue booting, proceed to <Save & Exit> Menu Option
and select Boot Device or <Discard Changes and Exit>.
```

```
WARNING: If you choose to continue booting some Operating
Systems might not be able to complete boot correctly!
```

To resolve this issue, disable the option ROMs that are not needed for system booting. The BIOS Setup Utility provides the setup options to enable or disable the option ROMs at the PCIe slot level for the PCIe expansion slots and at the port level for the onboard NICs. These options can be found in the BIOS Setup Utility **Advanced** → **PCI Configuration** page (see [Figure 3-26](#)).



Figure 3-26 BIOS Setup Utility Advanced &gt; PCI Configuration Page



- Guidelines for RAID controller booting

When the server is configured in the factory, the RAID controllers are installed in PCIe slot 3 or slot 5 for single RAID controller configuration, or in both slot 3 and slot 5 for dual RAID controller configuration.

If the server is configured to boot primarily from RAID storage, make sure that the option ROMs for slot 3 or slot 5 are enabled in the BIOS, depending upon your RAID controller configuration. If the RAID controller does not appear in the system boot order even with the option ROMs for slot 3 and slot 5 enabled, the RAID controller option ROM might not have sufficient memory space to execute. In that case, disable other option ROMs that are not needed for the system configuration to free up some memory space for the RAID controller option ROM.

- Guidelines for onboard NIC PXE booting

If the system is configured to primarily perform PXE boot from onboard NICs, make sure that the option ROMs for the onboard NICs to be booted from are enabled in the BIOS Setup Utility. Disable other option ROMs that are not needed to create sufficient memory space for the onboard NICs PXE boot.

### Resolving Insufficient 16-Bit I/O Space

The system has only 64 KB of legacy 16-bit I/O resources available. This 64 KB of I/O space is divided between four CPUs in the system because the PCIe controller is integrated into the CPUs. This server BIOS has the capability to dynamically detect the 16-bit I/O resource requirement for each CPU and then balance the 16-bit I/O resource allocation between the CPUs accordingly during the PCI bus enumeration phase of the BIOS POST.

When a large number of PCIe cards are installed in the system, the system BIOS might not have sufficient I/O space for some PCIe devices. If the system BIOS is not able to allocate the required I/O resources for any PCIe devices, the following symptoms have been observed:

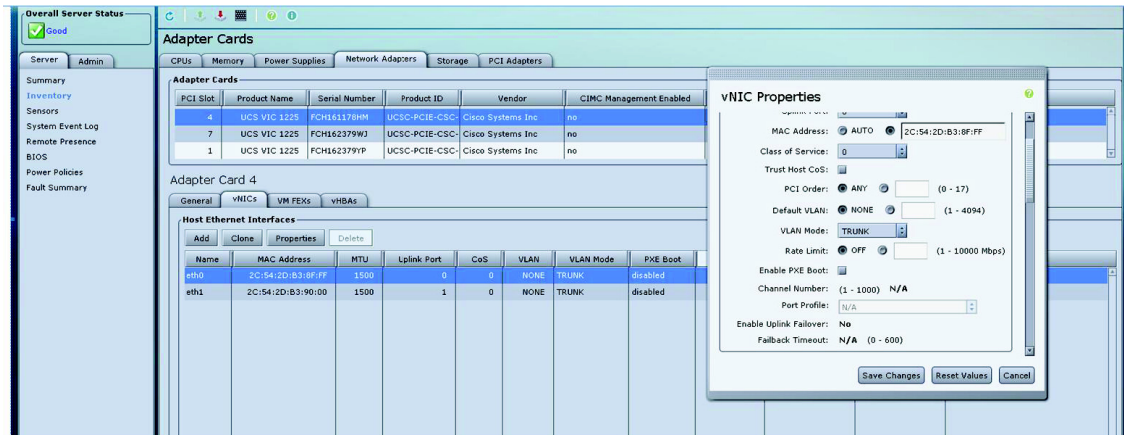
- The system might get stuck in an infinite reset loop.
- The BIOS might appear to hang while initializing PCIe devices.
- The PCIe option ROMs might take excessive time to complete, which appears to lock up the system.
- PCIe boot devices might not be accessible from the BIOS.
- PCIe option ROMs might report initialization errors. These errors are seen before the BIOS passes control to the operating system.
- The keyboard might not work.

To work around this problem, rebalance the 16-bit I/O load using the following methods:

1. Physically remove any unused PCIe cards.
2. If the system has one or more Cisco virtual interface cards (VICs) installed, disable the PXE boot on the VICs that are not required for the system boot configuration by using the Network Adapters page in the CIMC WebUI to free up some 16-bit I/O resources. Each VIC uses a minimum 16 KB of 16-bit I/O resource, so disabling PXE boot on Cisco VICs would free up some 16-bit I/O resources that can be used for other PCIe cards that are installed in the system.

Uncheck the “Enable PXE boot entry” in the vNIC properties dialog to disable the PXE boot, as shown in [Figure 3-27](#).

**Figure 3-27** vNIC Properties Dialog



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## Replacing the Supercap Power Module (RAID Backup Unit)

The server supports installation of up to two RAID controllers and up to two supercap power modules (SCPMs). These SCPMs mount to trays that are on the removable air baffle.

The SCPM is available only when using the LSI MegaRAID-CV controller cards. This module provides approximately 3 years of backup for the disk write-back cache DRAM in the case of sudden power loss by offloading the cache to the NAND flash.

**Warning**

**There is danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.**

Statement 1015

To replace the supercap power module, follow these steps:

**Step 1**

Remove an SCPM (see [Figure 3-28](#)):

- a. Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
- b. Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution**

If you cannot safely view and access the component, remove the server from the rack.

- c. Remove the top cover as described in [Removing and Replacing the Server Top Cover, page 3-9](#).
- d. Disconnect the cable that is attached to the SCPM.
- e. Remove the SCPM tray from the air baffle. Pinch the retaining clip on the side of the tray and slide it toward the rear to remove the tray from the air baffle.



**Note** There are two trays, an upper tray and a lower tray. Remove only the tray that holds the SCPM that you are replacing.

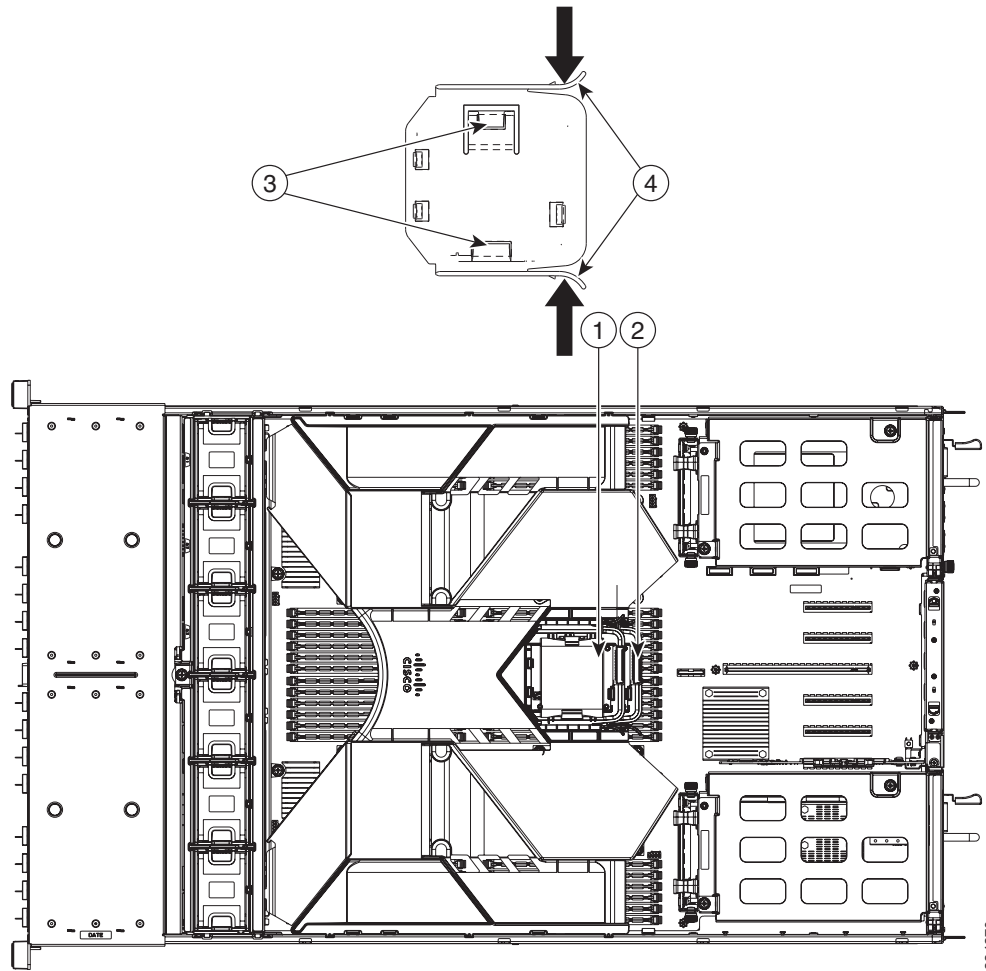
- f. Remove the SCPM from the clips on the SCPM tray.

**Step 2**

Install a new SCPM:

- a. Slide the new SCPM into the clips on the SCPM tray.
- b. Replace the SCPM tray to the air baffle. Slide it forward in the air baffle guides until the tray retaining clip clicks and locks in place.
- c. Connect the cable from the RAID controller to the new SCPM.
- d. Replace the top cover.
- e. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-28 Removing the SCPM



1	Upper SCPM tray on air baffle	3	SCPM retaining clips on tray
2	Lower SCPM tray on air baffle	4	SCPM tray release levers

## Installing a Trusted Platform Module

The trusted platform module (TPM) is a small circuit board that attaches to a motherboard socket. The socket location is on the motherboard, underneath the cage for power supply 1.

**Note**

For security purposes, the TPM is installed with a one-way screw. It cannot be removed with a standard screwdriver.

To install a trusted platform module (TPM), follow these steps:

**Step 1**

Prepare the server for component installation:

- a. Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
- b. Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution**

If you cannot safely view and access the component, remove the server from the rack.

- c. Remove the top cover as described in [Removing and Replacing the Server Top Cover, page 3-9](#).
- d. Remove the PCIe riser 1, which contains PCIe slot 1 (see [Figure 3-23 on page 3-40](#)). See [Replacing a PCIe Riser Assembly, page 3-35](#) for details.
- e. Remove power supply 1 from its cage. See [Replacing Power Supplies, page 3-54](#) for details.

**Step 2**

Install a TPM (see [Figure 3-29](#)):

- a. Locate the TPM socket on the motherboard, as shown in [Figure 3-29](#).
- b. Align the connector that is on the bottom of the TPM circuit board with the motherboard TPM socket. Align the screw hole and standoff on the TPM board with the screw hole that is adjacent to the TPM socket.
- c. Push down evenly on the TPM to seat it in the motherboard socket.
- d. Install the single one-way screw that secures the TPM to the motherboard.
- e. Replace power supply 1 to the empty bay.
- f. Replace the PCIe riser 1.
- g. Replace the top cover.
- h. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

**Step 3**

Enable the TPM:

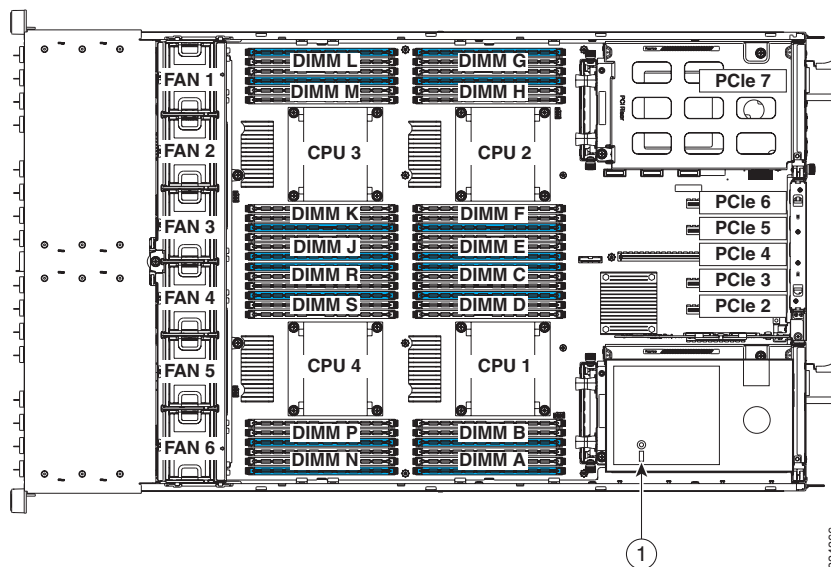
- a. Watch during bootup for the F2 prompt, and then press **F2** to enter BIOS setup.
- b. Log into the BIOS Setup utility with your BIOS Administrator password.
- c. On the BIOS Setup utility screen, select the **Advanced** tab.
- d. Select **Trusted Computing** to open the TPM Security Device Configuration screen.
- e. Change TPM SUPPORT to **Enabled**.
- f. Press **F10** to save your settings and reboot the server.

- Step 4** Verify that the TPM is now enabled.
- Watch during bootup for the F2 prompt, and then press **F2** to enter BIOS setup.
  - Log into the BIOS Setup utility with your BIOS Administrator password.
  - Select the **Advanced** tab.
  - Select **Trusted Computing** to open the TPM Security Device Configuration screen.
  - Verify that TPM SUPPORT is Enabled.



**Note** If you want to use the Intel Trusted Execution Technology (TXT) feature, you must enable it in the server BIOS as described in [Enabling the Intel Trusted Execution Technology Feature For the TPM, page 3-52](#).

**Figure 3-29** TPM Socket Location on Motherboard



- |          |   |
|----------|---|
| <b>1</b> | TPM socket and screw hole on motherboard (visible through power supply cage with PCIe riser 1 and power supply 1 removed) |
|----------|---|

## Enabling the Intel Trusted Execution Technology Feature For the TPM

Intel Trusted Execution Technology (TXT) provides greater protection for information that is used and stored on the business server. A key aspect of that protection is the provision of an isolated execution environment and associated sections of memory where operations can be conducted on sensitive data, invisibly to the rest of the system. Intel TXT provides for a sealed portion of storage where sensitive data such as encryption keys can be kept, helping to shield them from being compromised during an attack by malicious code.

To enable the TXT feature, follow these steps:

- 
- Step 1** Verify that a TPM is now installed and enabled in the server:
- Either attach a VGA monitor and USB keyboard to the server, or log in remotely to the CIMC interface of the server and open a virtual KVM console window.
  - Reboot the server.
  - Watch during bootup for the F2 prompt, and then press **F2** to enter BIOS setup.
  - Log in to the BIOS Setup utility with your BIOS Administrator password.



---

**Note** You must be logged in as the BIOS administrator to perform this procedure. If you have not done so already, set a BIOS administrator password on the Security tab of the BIOS Setup utility.

---

- Select the **Advanced** tab.
  - On the Advanced tab, select **Trusted Computing** to open the TPM Security Device Configuration screen.
  - Verify that **TPM SUPPORT** is **Enabled**. If it is not, set TPM SUPPORT to Enabled.
  - Press **Escape** to return to the BIOS Setup utility **Advanced** tab.
- Step 2** Enable the Intel Trusted Execution Technology (TXT) feature:
- On the Advanced tab, select **Intel TXT(LT-SX) Configuration** to open the Intel TXT(LT-SX) Hardware Support screen.



---

**Note** The Intel Trusted Execution Technology feature can be enabled only when the server has a TPM installed on the TPM header.

---

- Set **TXT Support** to **Enabled**.
- Step 3** On the same screen, verify that the Intel Virtualization Technology (VT) and the Intel VT for Directed I/O (VT-d) features are enabled (the factory default).
- On the Intel TXT(LT-SX) Hardware Support screen, verify that **VT-d Support** and **VT Support** are both listed as **Enabled**.
    - If they are already enabled, skip to [Step 4](#).
    - If VT-d Support and VT Support are not enabled, continue with the next steps to enable them.
  - Press **Escape** to return to the BIOS Setup utility **Advanced** tab.
  - On the Advanced tab, select **Processor Configuration** to open the Processor Configuration screen.
  - Set **Intel (R) VT** and **Intel (R) VT-d** to Enabled.

**Step 4** Press **F10** to save your changes and exit the BIOS Setup utility.

- Step 5** Verify that the Intel TXT, VT, and VT-d features are enabled:
- Reboot the server.
  - Watch during bootup for the F2 prompt, and then press **F2** to enter BIOS setup.
  - Select the **Advanced** tab.
  - Select **Intel TXT(LT-SX) Configuration** and verify that TXT Support, VT-d Support, and VT Support are Enabled.
-

## Replacing Power Supplies

The server can have one or two power supplies. When two power supplies are installed they are redundant as 1+1.

To replace or install a power supply, follow these steps:

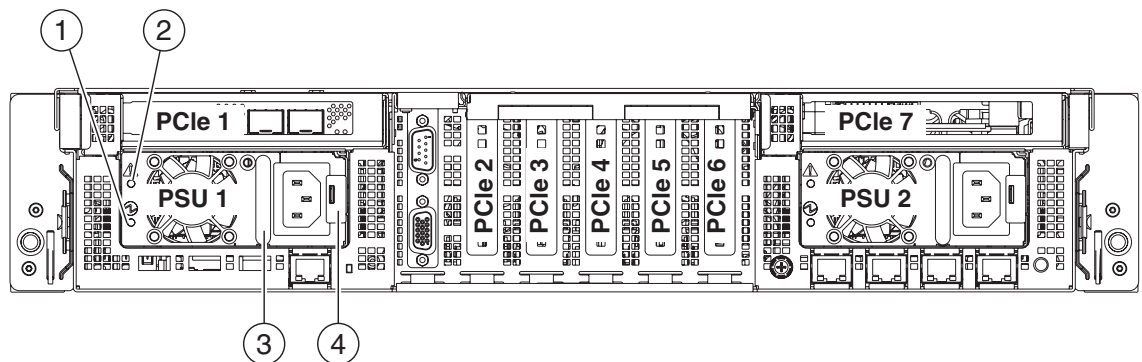


### Note

If you have ordered a server with power supply redundancy (two power supplies), you do not have to power off the server to replace power supplies because they are redundant as 1+1.

- Step 1** Remove the power supply that you are replacing or a blank panel from an empty bay (see [Figure 3-30](#)):
- a. Perform one of the following actions:
    - If your server has only one power supply, shut down and power off the server as described in the [“Shutting Down and Powering Off the Server”](#) section on page 3-8.
    - If your server has two power supplies, you do not have to shut down the server.
  - b. Remove the power cord from the power supply that you are replacing.
  - c. Grasp the power supply handle while pinching the release lever towards the handle.
  - d. Pull the power supply out of the bay.
- Step 2** Install a new power supply:
- a. Grasp the power supply handle and insert the new power supply into the empty bay.
  - b. Push the power supply into the bay until the release lever locks.
  - c. Connect the power cord to the new power supply.
  - d. If you shut down the server, press the **Power** button to return the server to main power mode.

**Figure 3-30** Removing and Replacing Power Supplies



1	Power supply status LED	3	Power supply handle
2	Power supply fault LED	4	Power supply release lever

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## Enabling or Disabling the Internal USB Port

The factory default is for all USB ports on the server to be enabled. However, the internal USB port can be enabled or disabled in the server BIOS. To enable or disable the internal USB port, follow these steps:

- 
- Step 1** Enter the BIOS Setup utility by pressing the **F2** key when prompted during bootup.
  - Step 2** Navigate to the **Advanced** tab.
  - Step 3** On the Advanced tab, select **USB Configuration**.
  - Step 4** On the USB Configuration page, select **USB Ports Configuration**.
  - Step 5** Scroll to **USB Port: Internal**, press **Enter**, and then select either Enabled or Disabled from the pop-up menu.
  - Step 6** Press F10 to save and exit the utility.
-





# APPENDIX **A**

## Server Specifications

---

This appendix lists the technical specifications for the Cisco UCS C420 Server and includes the following sections:

- [Physical Specifications, page A-1](#)
- [Environmental Specifications, page A-2](#)
- [Power Specifications, page A-2](#)

## Physical Specifications

[Table A-1](#) lists the physical specifications for the server.

**Table A-1**      *Physical Specifications*

<b>Description</b>	<b>Specification</b>
Height	3.5 in (89 mm)
Width	17.6 in (447 mm)
Length (including slide-rail inner rails)	31.5 in (800 mm)
Weight (maximum configuration)	78 lbs (35.38 kg)
Weight (maximum configuration, including slide rail inner rails and cable management arm)	86 lbs (39.00 kg)

# Environmental Specifications

Table A-2 lists the environmental specifications for the server.

**Table A-2** Environmental Specifications

Description	Specification
Temperature, operating	5°C to 35°C (41°F to 95°F)
Temperature, nonoperating (when the server is stored)	-40°C to 65°C (-40°F to 149°F)
Humidity, nonoperating	10% to 90%
Altitude, operating Derated 1°C for each 305 m	0 m to 3048 m (0 ft to 10,000 ft)
Altitude, nonoperating (when the server is stored)	0 m to 12,192 m (0 ft to 40,000 ft)

# Power Specifications

Table A-3 lists the specifications for each 1200 W power supply (Cisco part number UCSC-PSU2-1200).

**Table A-3** 1200 W Power Supply Specifications

Description	Specification
AC input voltage	200 to 240 VAC nominal (Range: 180 to 264 VAC)
Low AC input voltage (limited to 800 W system configurations)	100 to 120 VAC nominal (Range: 90 to 132 VAC)
AC input frequency	50 to 60 Hz nominal (Range: 47 to 63 Hz)
Maximum AC-input current	10 A
Maximum output power for each power supply	1200 W (up to two power supplies can be installed)
Power supply output voltage	Main power: 12 VDC Standby power: 12 VDC

You can get more specific power information for your exact server configuration by using the Cisco UCS Power Calculator:

[http://www.cisco.com/assets/cdc\\_content\\_elements/flash/dataCenter/cisco\\_ucs\\_power\\_calculator/](http://www.cisco.com/assets/cdc_content_elements/flash/dataCenter/cisco_ucs_power_calculator/)



# APPENDIX **B**

## Power Cord Specifications

This appendix provides supported power cable specifications.

### Supported Power Cords and Plugs

Each power supply has a separate power cord. Standard power cords or jumper power cords are available for connection to the server. The jumper power cords, for use in racks, are available as an optional alternative to the standard power cords.



**Note**

Only the approved power cords or jumper power cords provided with the server are supported.

[Table B-1](#) lists the power cords for the server power supplies.

**Table B-1** Supported Power Cords for the Server

Description	Length		Power Cord Reference Illustration
	Feet	Meters	
SFS-250V-10A-AR Power Cord, 250 VAC 10 A IRAM 2073 Plug Argentina	8.2	2.5	<a href="#">Figure B-1</a>
CAB-9K10A-AU 250 VAC 10 A 3112 Plug, Australia	8.2	2.5	<a href="#">Figure B-2</a>
SFS-250V-10A-CN Power Cord, 250 VAC 10 A GB 2009 Plug China	8.2	2.5	<a href="#">Figure B-3</a>
CAB-9K10A-EU Power Cord, 250 VAC 10 A M 2511 Plug Europe	8.2	2.5	<a href="#">Figure B-4</a>
SFS-250V-10A-ID Power Cord, 250 VAC 16A EL-208 Plug South Africa, United Arab Emirates, India	8.2	2.5	<a href="#">Figure B-5</a>
SFS-250V-10A-IS Power Cord, 250 VAC 10 A SI32 Plug Israel	8.2	2.5	<a href="#">Figure B-6</a>

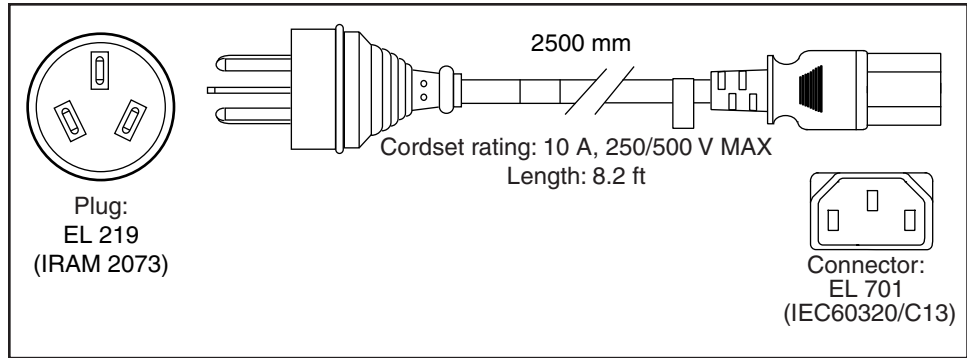
**Table B-1** Supported Power Cords for the Server (continued)

Description	Length		Power Cord Reference Illustration
	Feet	Meters	
CAB-9K10A-IT Power Cord, 250 VAC 10 A CEI 23-16 Plug Italy	8.2	2.5	<a href="#">Figure B-7</a>
CAB-9K10A-SW Power Cord, 250 VAC 10 A MP232 Plug Switzerland	8.2	2.5	<a href="#">Figure B-8</a>
CAB-9K10A-UK Power Cord, 250 VAC 10 A BS1363 Plug (13 A fuse) United Kingdom	8.2	2.5	<a href="#">Figure B-9</a>
CAB-AC-250V/13A Power Cord, 250 VAC 13 A IEC60320 Plug North America	6.6	2.0	<a href="#">Figure B-10</a>
CAB-N5K6A-NA Power Cord, 250 VAC 13 A NEMA 6-15 Plug, North America	8.2	2.5	<a href="#">Figure B-11</a>
CAB-9K12A-NA Power cord, 125 VAC, 13 A, NEMA 5-15 Plug North America	8.2	2.5	<a href="#">Figure B-12</a>
CAB-C13-CBN Cabinet Jumper Power Cord, 250 VAC 10 A, C13-C14 Connectors	2.2	0.68	<a href="#">Figure B-13</a>
CAB-C13-C14-2M Cabinet Jumper Power Cord, 250 VAC 10 A, C13-C14 Connectors	6.6	2.0	<a href="#">Figure B-14</a>
CAB-C13-C14-AC Cabinet Jumper Power Cord, 250 VAC 10 A, C13-C14 Connectors	9.8	3.0	<a href="#">Figure B-15</a>

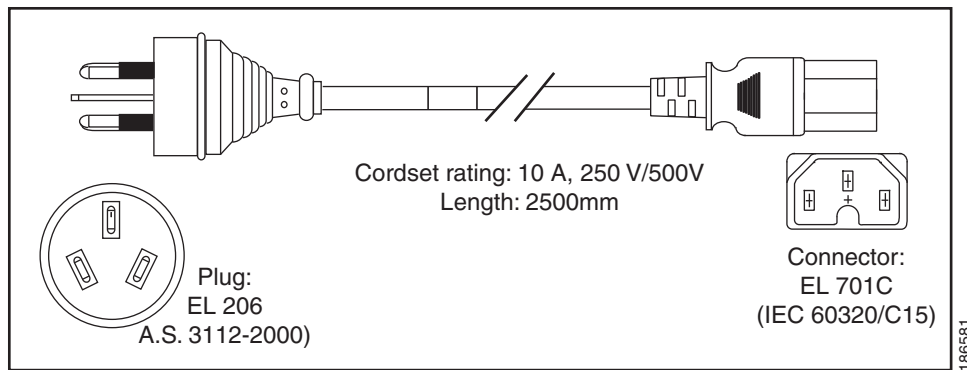
# AC Power Cord Illustrations

This section includes the AC power cord illustrations. See [Figure B-1](#) through [Figure B-15](#).

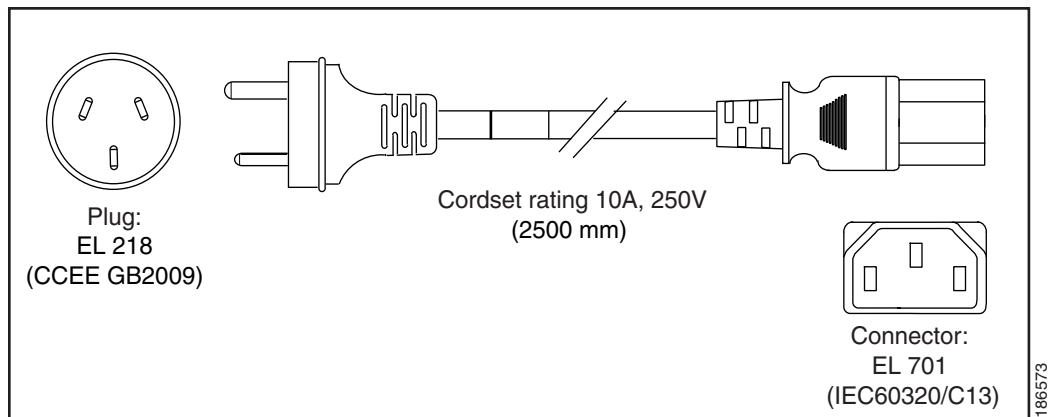
**Figure B-1 SFS-250V-10A-AR**



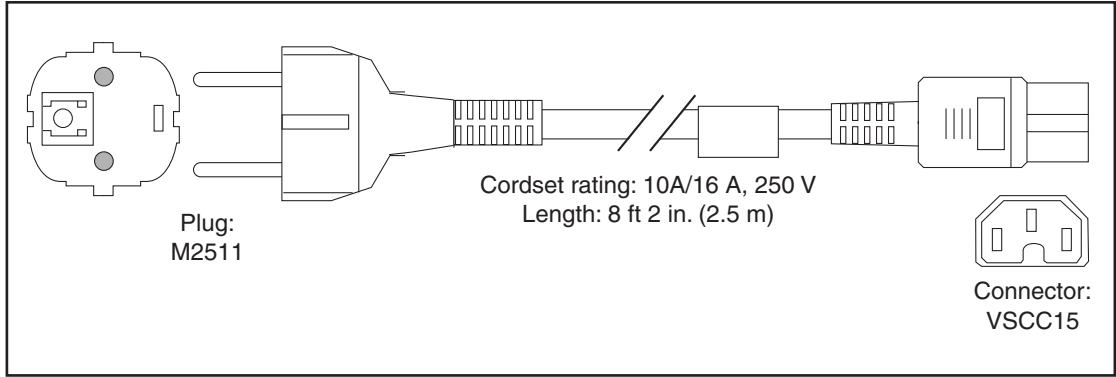
**Figure B-2 CAB-9K10A-AU**



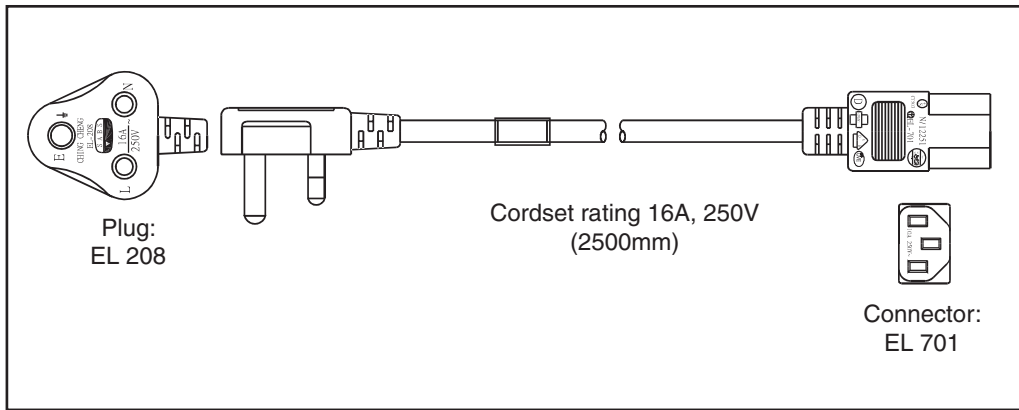
**Figure B-3 SFS-250V-10A-CN**



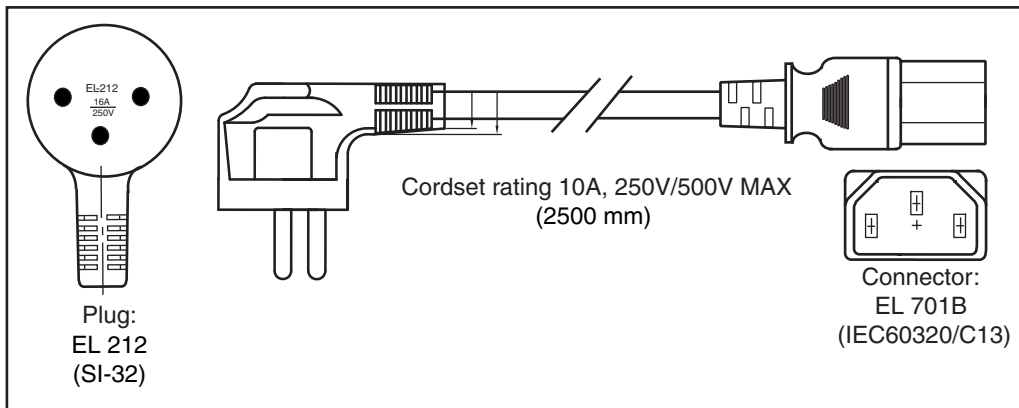
**Figure B-4 CAB-9K10A-EU**



**Figure B-5 SFS-250V-10A-ID**

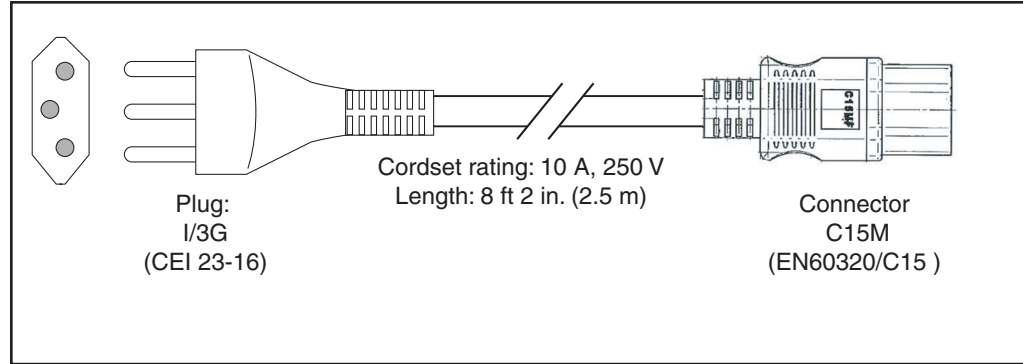


**Figure B-6 SFS-250V-10A-IS**

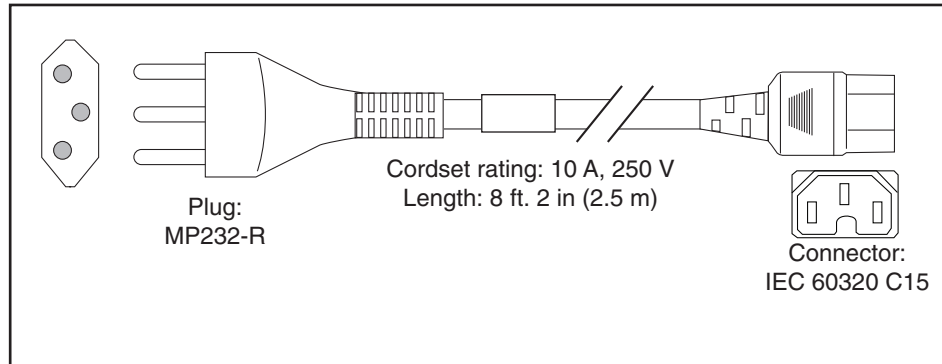




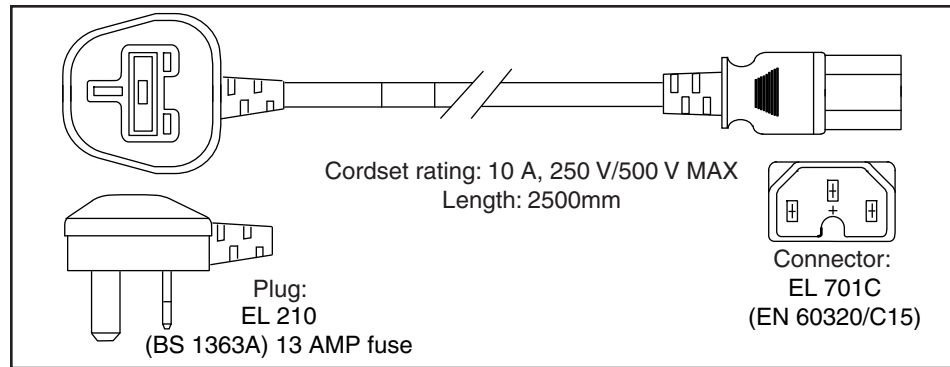
**Figure B-7 CAB-9K10A-IT**



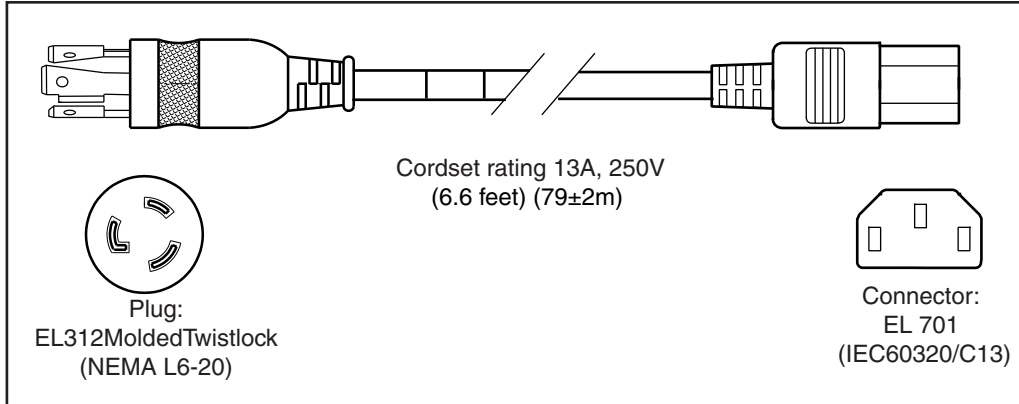
**Figure B-8 CAB-9K10A-SW**



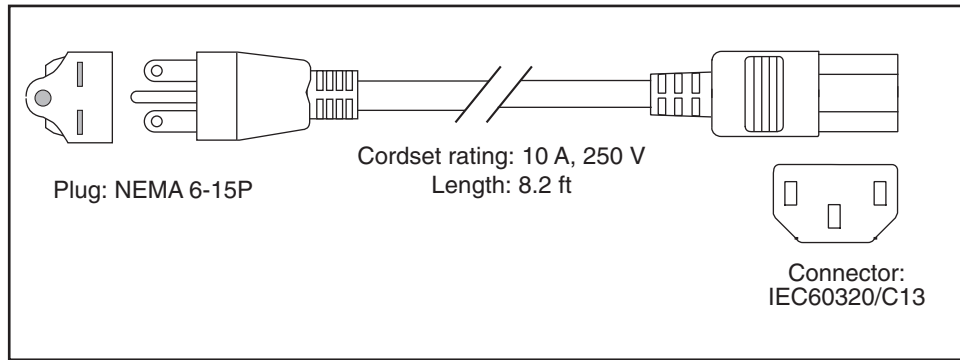
**Figure B-9 CAB-9K10A-UK**



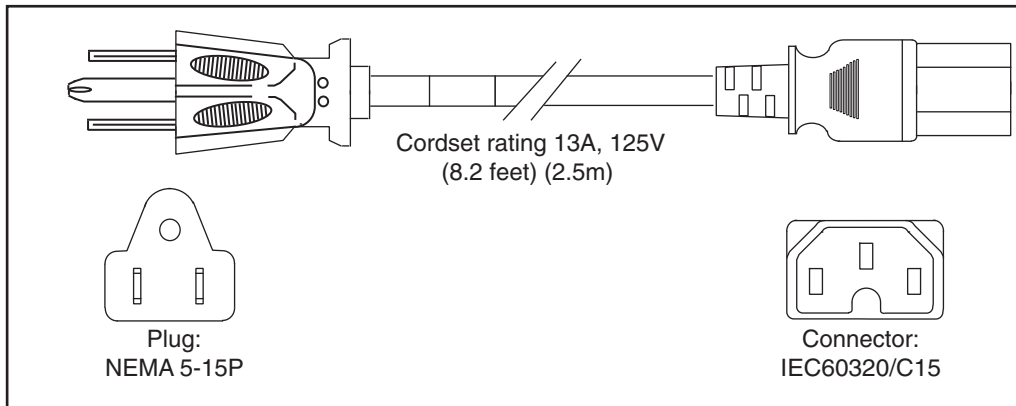
**Figure B-10 CAB-AC-250V/13A**



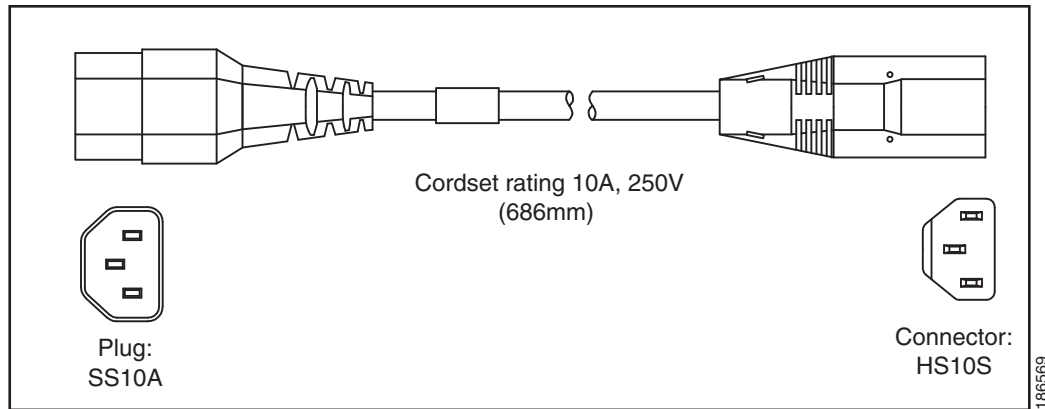
**Figure B-11 CAB-N5K6A-NA**



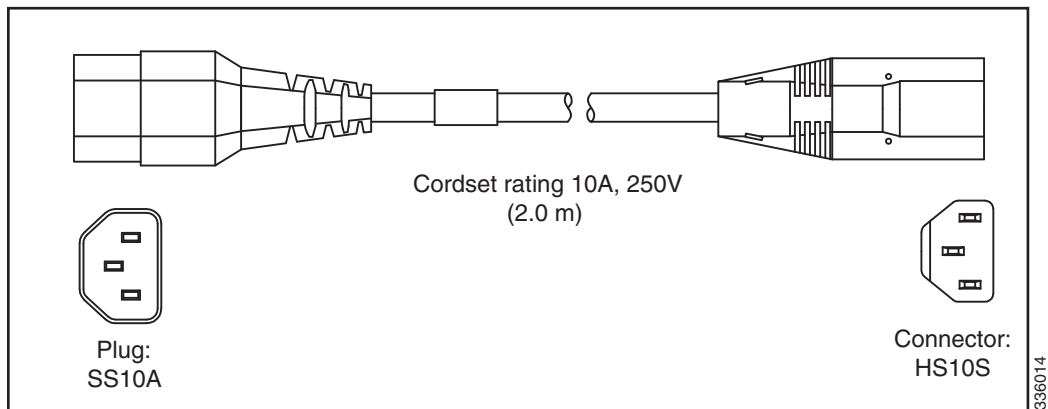
**Figure B-12 CAB-9K12A-NA**



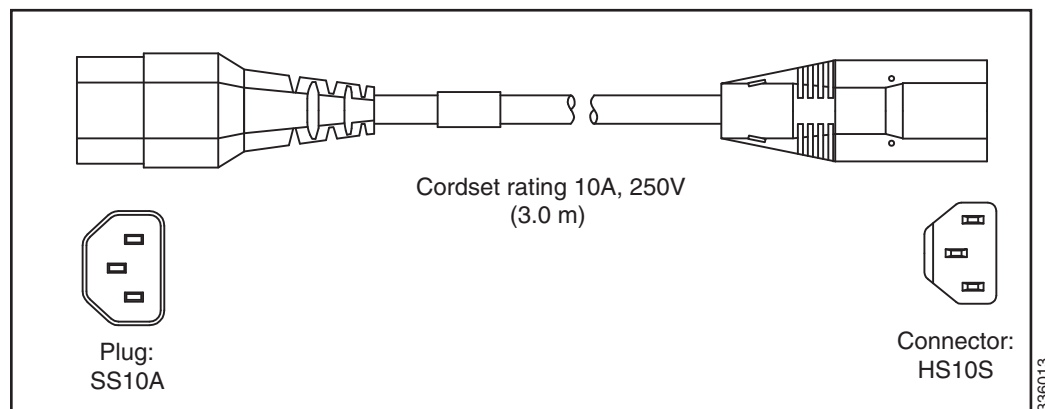
**Figure B-13 CAB-C13-CBN, Jumper Power Cord (0.68 m)**



**Figure B-14 CAB-C13-C14-2M, Jumper Power Cord (2 m)**



**Figure B-15 CAB-C13-C14-AC, Jumper Power Cord (3 m)**







## RAID Controller Considerations

This appendix provides RAID controller information, and it includes the following sections:

- [Supported RAID Controllers and Required Cables, page C-1](#)
- [Supercap Power Modules \(RAID Backup Units\), page C-2](#)
- [Mixing Drive Types in RAID Groups, page C-2](#)
- [RAID Controller Cabling, page C-2](#)
- [Restoring RAID Configuration After Replacing a RAID Controller, page C-6](#)
- [For More Information, page C-6](#)

## Supported RAID Controllers and Required Cables

This server supports the RAID controller options and cable requirements shown in [Table C-1](#).

**Note**

Do not mix controller types in the server.

**Table C-1** Cisco UCS C420 Server Supported RAID Options

Controller	Style	Maximum Drives	Optional SCPM?	RAID Levels	Required Cables <sup>1</sup>
LSI MegaRAID SAS 9271CV-8i	PCIe	8 internal <sup>2</sup> or 16 internal with expander <sup>3</sup>	Yes	0, 1, 5, 6, 10, 50, 60	<ul style="list-style-type: none"><li>• One controller with one nonexpander: 1 UCSC-CABLE-S + 1 UCSC-CABLE-L</li><li>• Two controllers with two nonexpanders: 2 UCSC-CABLE-S + 2 UCSC-CABLE-L</li><li>• One controller with two expanders: 2 UCSC-CABLE-S</li></ul>
LSI MegaRAID SAS 9286CV-8e	PCIe	128 external	Yes	0, 1, 5, 6, 10, 50, 60	Cisco does not sell the cables for external drives.

1. The number and type of cables vary, depending on which type of transition card is used and how many controllers are used. See also [RAID Controller Cabling, page C-2](#).
2. When using the nonexpander-style transition card, each controller can support 8 drives; you can install two controllers and two nonexpander transition cards to control a total of 16 drives.
3. When using two expander-style transition cards, one controller can control 16 drives.

## Supercap Power Modules (RAID Backup Units)

This server supports installation of two supercap power module (SCPM) backup units. The units mount to trays on the removable air baffle (see [Replacing the Supercap Power Module \(RAID Backup Unit\)](#), page 3-49).

The SCPM is available only when using the LSI MegaRAID-CV controller cards. This module provides approximately 3 years of backup for the disk write-back cache DRAM in the case of sudden power loss by offloading the cache to the NAND flash.

## Mixing Drive Types in RAID Groups

[Table C-2](#) lists the technical capabilities for mixing hard disk drive (HDD) and solid state drive (SSD) types in a RAID group. However, see the best practices recommendations that follow for the best performance.

**Table C-2** Drive Type Mixing in RAID Groups

Mix of Drive Types in RAID Group	Allowed?
SAS HDD + SATA HDD	Yes
SAS SSD + SATA SSD	Yes
HDD + SSD	No

### Best Practices For Mixing Drive Types in RAID Groups

For the best performance, follow these guidelines:

- Use either all SAS or all SATA drives in a RAID group.
- Use the same capacity for each drive in the RAID group.
- Never mix HDDs and SSDs in the same RAID group.

## RAID Controller Cabling

The maximum two supported RAID controller cards should be populated in PCIe slots in the following order (see [Figure 3-23 on page 3-40](#)):

1. PCIe slot 3
2. PCIe slot 5

Refer to the following examples for cable routing guidelines:

- [Example 1—One Nonexpander and One RAID Controller with Eight Drives](#), page C-3
- [Example 2—Two Nonexpanders and Two RAID Controllers with 16 Drives](#), page C-4
- [Example 3—Two Expanders and One RAID Controller with Sixteen Drives](#), page C-5

For more information about transition cards, see [Replacing a Modular Drive Bay Assembly](#), page 3-14.

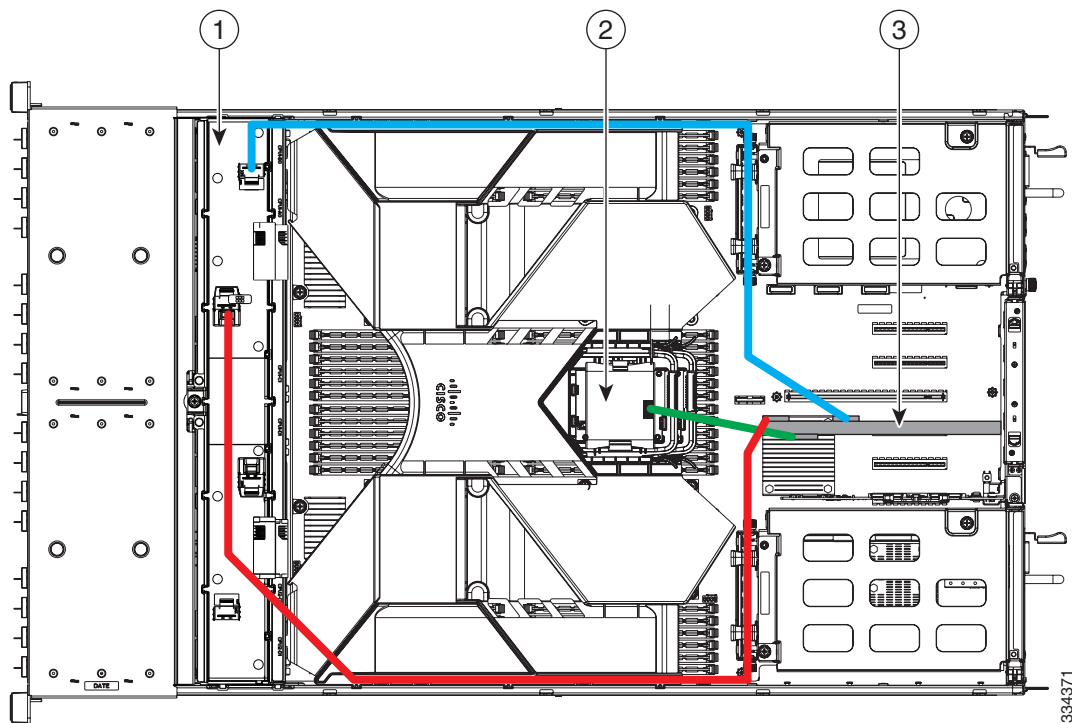
## Example 1—One Nonexpander and One RAID Controller with Eight Drives

Figure C-1 shows an example of a server that is using one RAID controller in PCIe slot 3 and a nonexpander transition card to control eight drives in the modular drive bay.

Two RAID cables are required (1 UCSC-CABLE-S and 1 UCSC-CABLE-L).

- The **blue** line is a 0.8m cable (UCSC-CABLE-S) from the RAID controller SAS 0 connector to the nonexpander connector for PORT 1–4.
- The **red** line is a 1m cable (UCSC-CABLE-L) from the RAID controller SAS 1 connector to the nonexpander connector for PORT 5–8.
- The **green** line is the cable from the RAID controller to the SCPM backup unit.

**Figure C-1** RAID Controller Cabling Guidelines, Nonexpander Transition Card



<b>1</b>	Nonexpander transition card (shown with fan tray removed)	<b>3</b>	RAID controller card in PCIe slot 3
<b>2</b>	SCPM backup unit (mounted to tray on air baffle)		

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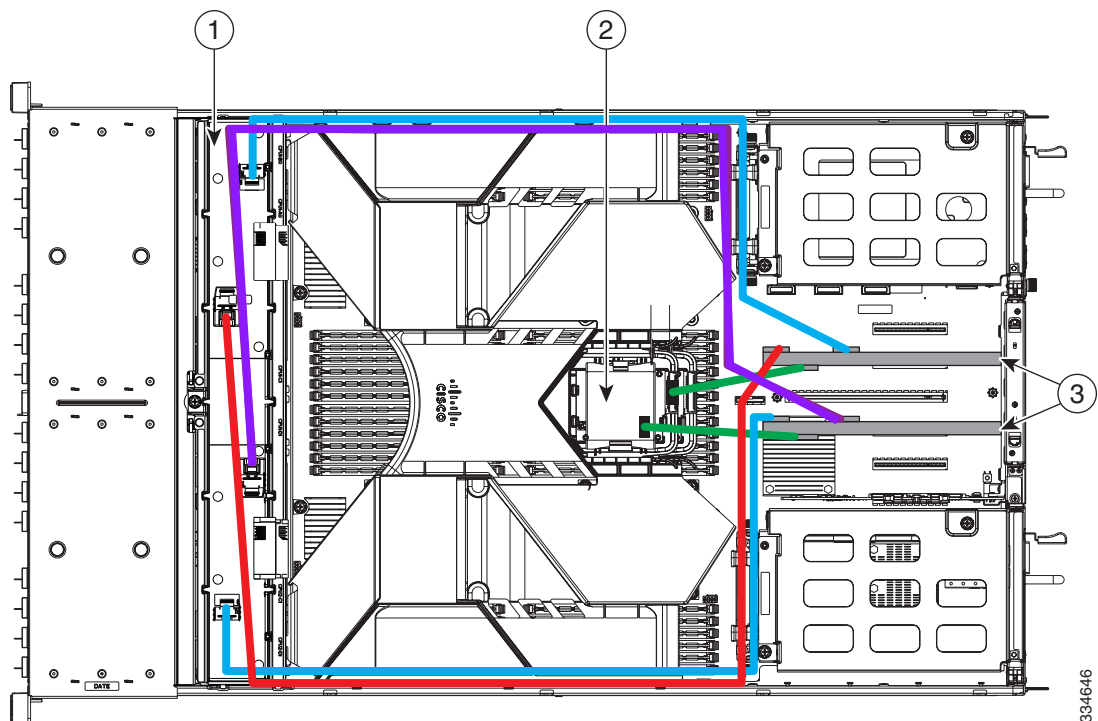
## Example 2—Two Nonexpanders and Two RAID Controllers with 16 Drives

Figure C-2 shows an example of a server that is using two RAID controllers in PCIe slots 3 and 5 and two nonexpander transition cards to control eight drives in each of the two modular drive bays.

Four RAID cables are required (2 x UCSC-CABLE-L and 2 x UCSC-CABLE-S).

- The upper **blue** line is a 0.8m cable (UCSC-CABLE-S) from the slot 5 RAID controller SAS 0 connector to the nonexpander connector for PORT 1–4.
- The upper **red** line is a 1m cable (UCSC-CABLE-L) from the slot 5 RAID controller SAS 1 connector to the nonexpander connector for PORT 5–8.
- The **violet** line is a 1m cable (UCSC-CABLE-L) from the slot 3 RAID controller SAS 0 connector to the nonexpander connector for PORT 1–4.
- The lower **blue** line is a 0.8m cable (UCSC-CABLE-S) from the slot 3 RAID controller SAS 1 connector to the nonexpander connector for PORT 5–8.
- The **green** lines are the cables from the two RAID controllers to their respective SCPM backup units.

**Figure C-2** RAID Controller Cabling Guidelines, Two Nonexpanders and Two Controllers



<b>1</b>	Transition cards, nonexpander version (shown with fan tray removed)	<b>3</b>	RAID controller cards in PCIe slots 3 and 5
<b>2</b>	SCPM backup units (two, mounted to trays on air baffle)		



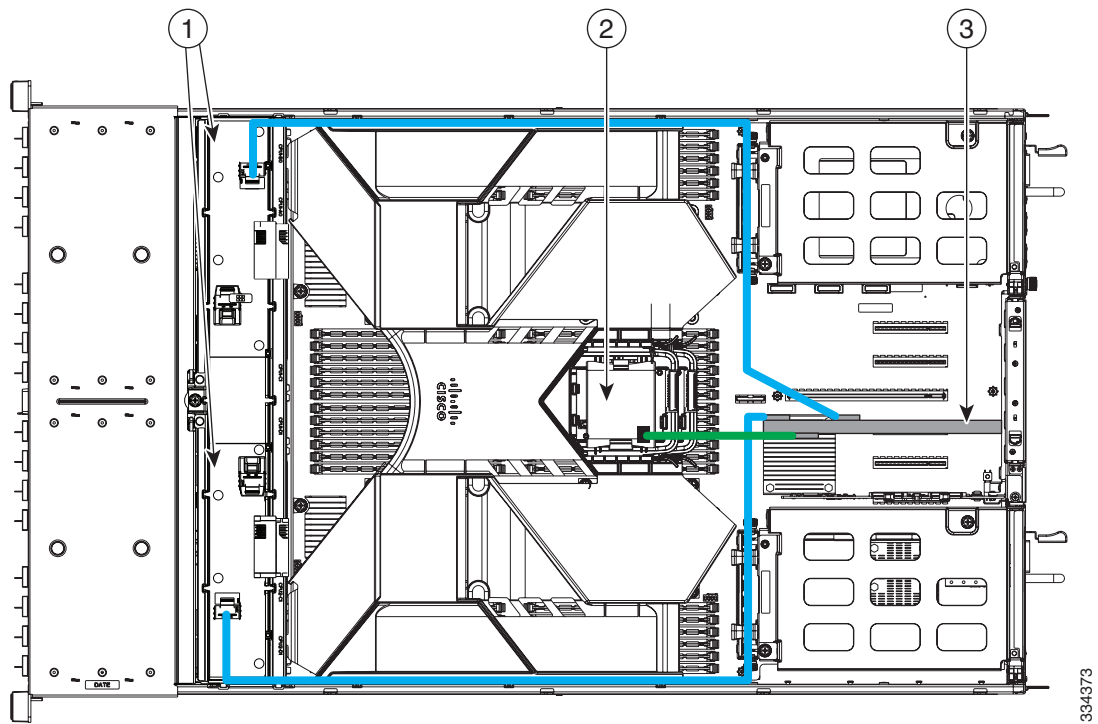
## Example 3—Two Expanders and One RAID Controller with Sixteen Drives

Figure C-3 shows an example of a server that is using one RAID controller in PCIe slot 3 and two expander transition cards to control eight drives in each of the two modular drive bays.

Two RAID cables are required (2 x UCSC-CABLE-S).

- The upper blue line is a 0.8m cable (UCSC-CABLE-S) from the RAID controller SAS 0 connector to the first expander connector A (for drives 1 through 8).
- The lower blue line is a 0.8m cable (UCSC-CABLE-S) from the RAID controller SAS 1 connector to the second expander connector B (for drives 9 through 16).
- The green line is a cable from the RAID controller to the battery backup unit.

**Figure C-3** RAID Controller Cabling Guidelines, Two Expanders and One Controller



1	Expander transition cards (shown with fan tray removed)	3	RAID controller card in PCIe slot 3
2	SCPM backup unit (mounted to tray on air baffle)		

# Restoring RAID Configuration After Replacing a RAID Controller

When you replace a RAID controller, the RAID configuration that is stored in the controller is lost. To restore your RAID configuration to your new RAID controller, follow these steps.

- 
- Step 1** Replace your RAID controller. See [Replacing a PCIe Card in a Motherboard Slot, page 3-43](#).
- Step 2** If this was a full chassis swap, replace all drives into the drive bays, in the same order that they were installed in the old chassis.
- Step 3** Reboot the server and watch for the prompt to press F.




---

**Note** For newer RAID controllers, you are not prompted to press F. Instead, the RAID configuration is imported automatically. In this case, skip to [Step 6](#).

---

- Step 4** Press F when you see the following onscreen prompt:
- ```
Foreign configuration(s) found on adapter.
Press any key to continue or 'C' load the configuration utility,
or 'F' to import foreign configuration(s) and continue.
```
- Step 5** Press any key (other than C) to continue when you see the following onscreen prompt:
- ```
All of the disks from your previous configuration are gone. If this is
an unexpected message, then please power of your system and check your cables
to ensure all disks are present.
Press any key to continue, or 'C' to load the configuration utility.
```
- Step 6** Watch the subsequent screens for confirmation that your RAID configuration was imported correctly:
- If you see the following message, your configuration was successfully imported. The LSI virtual drive is also listed among the storage devices.
 

```
N Virtual Drive(s) found on host adapter.
```
  - If you see the following message, your configuration was not imported. This problem can occur if you do not press F quickly enough when prompted. In this case, reboot the server and try the import operation again when you are prompted to press F.
 

```
0 Virtual Drive(s) found on host adapter.
```
- 

## For More Information

The LSI utilities have help documentation for more information about using the utilities.

For basic information about RAID and for using the utilities for the RAID controller cards, see the [Cisco UCS Servers RAID Guide](#).

Full LSI documentation is also available:

LSI MegaRAID SAS Software User's Guide (for LSI MegaRAID)

[http://www.lsi.com/DistributionSystem/AssetDocument/80-00156-01\\_RevH\\_SAS\\_SW\\_UG.pdf](http://www.lsi.com/DistributionSystem/AssetDocument/80-00156-01_RevH_SAS_SW_UG.pdf)



■ For More Information



APPENDIX

D

## Installation for Cisco UCS Integration

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The Cisco UCS integration instructions have been moved to the integration guides found here:  
[Cisco UCS C-Series Server Integration with UCS Manager Guides](#)

Refer to the guide that is for the version of Cisco UCS Manager that you are using.

